AUSSIE PUMPS
PUMP SELECTION GUIDE

AUSTRALIAN PUMP

Certified System
Quality
ISO 9001
SAI GLOBAL

For information on fire pumps and how to set a fire protection system …. click here

LET'S TALK ABOUT PUMPS

If you're a farmer, contractor, council or rental company, chances are you not only own pumps, but have a very good understanding of how they work and are applied for the best results.

Aussie self priming centrifugal pumps are used for a wide range of applications that include fire fighting, irrigation, high and low pressure water transfer, agricultural spraying, and even mine dewatering.

We're proud of the fact that Aussie pumps make life easier for farmers, miners, contractors and domestic users.

Our pumps are used all around the world, and chosen for their efficiency, low environmental footprint and reliability. Only Aussie Quik Prime self priming centrifugal pumps come with a 5 year guarantee!

Pumps and the User

There are many types of pumps available in today's market. Not one type of pump is ideal for all applications, and users should take the time to understand what product will give them the best result in overall performance, value for money and through life cost. Australian Pump offers a wide range of various types of self priming pump, with a huge variation of engineering specification designed to suit most portable pump applications.

What do customers expect?

This depends on the application, but whether it's a farmer, contractor or mining company, what counts is the following:-

- **Performance**…the ability to move water, in volume at high or low pressure in the minimum time frame.
- **Efficiency**…Fuel costs continue to rise, so getting the job done with the minimum fuel cost becomes increasingly important.
- **Quality Design**...This translates to the pump's ability to handle the job, transferring key benefits like efficiency, longevity and convenience to the user.
- **Durability**…Aussie Quik Prime pumps handle harsh environmental work conditions better, because they're built better, using top class materials and expert labour.
- **Guarantee**…Only Aussie Quik Prime pumps come with a 5 year warranty, the first in the industry.
- **Value**…Whether it's an Aussie Fire Chief fire pump, or big 6 inch mine dewatering trash pump, Aussie products offer unparalleled value, giving you more pump for your dollar.

Common water pump designs

90% of the pumps found in agriculture or construction are of the centrifugal design.

This type of pump uses a rotating impeller to draw water from the pump and pressurise the discharge flow. Common pumps in this design include high pressure fire pumps, water transfer pumps (or gushers), trash pumps and even diesel fuel transfer pumps.

The second type of pump, designed for super high head applications is the positive displacement design. These pumps offer a fixed amount of flow per cycle providing an ability to pump liquids to pressures of up to 50 bar, i.e. 500 metres.

These two types of pumps will be covered in further detail on page 4.

THE BASICS OF PUMP THEORY

It is common for customers to say they need a pump to suck water out of a hole or trench. However, centrifugal pumps and diaphragm pumps do not actually suck water so much as they raise or lift it with help from mother nature.

Water, like electricity, will always flow along a path of least resistance. In order to lift water, the pump must provide a path (area of low pressure or low resistance) to which water will naturally seek to follow.

It is critical then to recognize the role atmospheric pressure plays in creating suction lift. At sea level the atmosphere exerts a force of 14.7 lb/in^2 (PSI) on the earth's surface. The weight of the atmosphere on a body of water will prevent lift from occurring unless an area of low pressure is created.

Figure 1 show three hollow tubes, each with a surface area of 1in^2 rising from sea level up into the atmosphere. In tube (A) atmospheric pressure is the same inside the tube as it is outside: 14.7PSI. Since the weight of the atmosphere is being exerted equally across the surface, no change occurs in the water level inside the tube.

In tube (B) a perfect vacuum is created making atmospheric pressure greater on the water outside the tube. The resulting differential causes water, flowing naturally to the area of lowest pressure to begin filling the tube until it reaches a height of 10.3m.

Why is 10.3m the highest water can be lifted in this example? Because at this point the weight of the water inside the tube exerts a pressure equal to the weight of the atmosphere pushing down on the oceans surface. This height represents the maximum theoretical suction lift and can be verified using the following calculation.

Divide atmospheric pressure at sea level by .0361 lb/in^3 (the weight of one cubic inch of water) to obtain the theoretical suction lift.

14.7 (psi) divided by .0361 (lb/in^3) = 407.28 (in)= 10.3m

Remember that 10.3m is the maximum theoretical height water can be lifted under prefect conditions at sea level. It does not take into consideration altitude, friction loss, temperature, suspended particles or the inability to create a perfect vacuum. All these variables affect pump performance and reduce theoretical suction lift. The practical suction lift, attainable for cold water (15°C) at sea level by creating a partial vacuum, is the 7.6m reflected in tube (C).

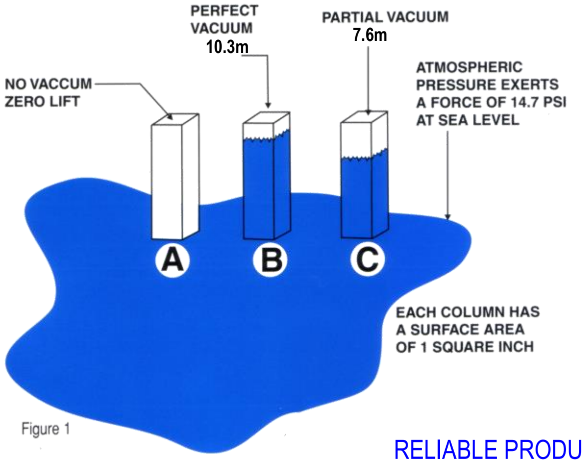


Figure 1

CENTRIFUGAL DESIGNS

The overwhelming majority of contractor pumps use centrifugal force to move the water. Centrifugal force is defined as the action that causes something, in this case water, to move away from its centre of rotation.

All centrifugal pumps use an impeller and volute to create the partial vacuum and discharge pressure necessary to move water through the casing. The impeller and volute form the heart of a pump and help determine its flow, pressure and solid handling capability.

An impeller is a rotating disk with a set of vanes coupled to the engine / motor shaft that produces centrifugal force with the pump casing. A volute is the stationary housing in which the impeller rotates that collects, discharges and re-circulates water entering the pump. A diffuser is used on high pressure pumps and is similar to a volute but more compact in design. Many types of material can be used in their manufacture but cast iron is most commonly used for construction applications.

In order for a centrifugal or self priming pump to attain it's initial prime the casing must first be manually primed or filled with water. Afterwards, unless it is run dry or drained, a sufficient amount of water should remain in the pump to ensure quick priming the next time it's needed.

As the impeller churns water (Figure 2), it purges air from the casing creating an area of low pressure or partial vacuum, at the eye (centre) of the impeller. The weight of the atmosphere in the external body of water pushes water rapidly through the hose and pump casing towards the eye of the impeller.

Centrifugal force created by the rotating impeller pushes water away from the eye, when pressure is lowest, to the vane tips where pressure if the highest. The velocity of the rotating vanes pressurize the water forced through the volute and discharged from the pump.

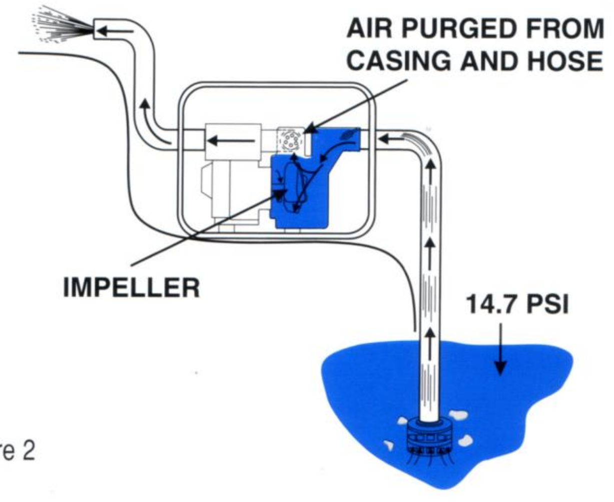


Figure 2

THE PUMP IS SELF PRIMING, WHY DO I NEED TO ADD WATER?

There are many high end pumps on the market that do not need to be manually primed before operation. These are vacuum assisted pumps that use an air compressor or some other device to separate the air and water. This enables the pump to start dry and re-prime itself without manually adding water. A number of different trade names are used for these pumps (Zero Prime, No Prime, etc.) that may cause customers to wonder why small contractor pumps are called self priming.

Most centrifugal pumps require the pump casing to be filled with water (manually primed) before starting. Self priming is a term used to generally describe many types of centrifugal pumps. This very simply means the pumps has the ability to purge air from its casing and suction hose creating a partial vacuum allowing water to flow freely into the pump.

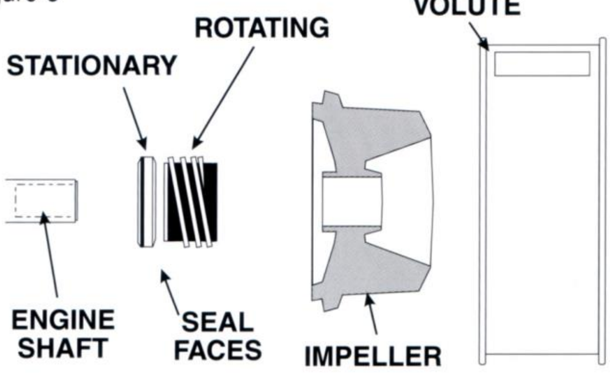
Water passing through the pump brings with it solids and other abrasive material that will gradually wear down the impeller or volute. This wear can increase the distance between the impeller and the volute resulting in decreased flows, heads and longer priming times. Periodic inspection and maintenance is necessary to keep pumps running like new.

Another key component of the pump is it's mechanical seal. This spring loaded component consists of two faces, one stationary and another rotating, and is located on the engine shaft between the impeller and rear casing (Figure 3). It is designed to prevent water from seeping into and damaging the engine. Pumps designed for work in harsh environments will require a seal that is more abrasion resistant.

Typically seals are cooled by water as it passes through the pump. If the pump is dry or has insufficient water for priming it could damage the mechanical seal. Oil lubricated and occasionally grease lubricated seals are available on some pumps that provide positive lubrication in the event the pumps is run without water. The seal is a common wear part and should also be periodically inspected.

Regardless of whether the application calls for a standard, high pressure or trash pump, every centrifugal pump lifts and discharges water in the same way. The following section will point out design differences between these pumps.

Figure 3



HIGH VOLUME SELF PRIMING CENTRIFUGAL PUMPS

Aussie gushers are self priming centrifugal pumps designed for high volume water transfer at relatively low heads. They can be used for dewatering, water cart application, or with the right modifications, even diesel fuel transfers.

Australian Pump offer a wide range, from 1½" to 6" with flows from 300 litres per minute to 2900 litres per minute and heads of up to 33 metres.

These pumps are recommended for use in clear water applications (in agriculture, industry or domestic) as their solids handling capability is limited to around 10% of pump volume. The impellers, typically of heavy duty high SG cast iron, come in an open style 3 vane design. The volute is compact, generally preventing the passage of large solids. The general rule of thumb is that the pump will only pass spherical solids of a quarter of the diameter of the suction inlet.

Builders and construction companies often use high volume Aussie self primers for a wide range of duties that can include site dewatering. They are limited in that application, compared to Aussie trash pumps, but offer an advantage in terms of lower initial cost. There are a number of reasons for the cost difference, and they include the use of lower horsepower engines, providing more compact design and increased fuel efficiency; mechanical seals designed for less harsh working conditions than trash pumps and therefore less expensive to make; castings are smaller and have fewer machined parts making pumps lighter in weight and less expensive to build.

HIGH PRESSURE SELF PRIMING CENTRIFUGAL PUMPS

High pressure self priming centrifugal pumps are used in applications where relatively low flows are required to be discharged at high pressure. Typical is the Aussie Fire Chief, a pump that delivers up to 80 metres head, and a maximum flow of 500 litres a minute. They are used in a wide range of applications that include on farm duties, like high pressure water transfer, agricultural spray, machinery wash down, and of course bush fire fighting. The Aussie Fire Chief is regarded as the finest light weight portable fire pump in the world, and has been chosen by major Australian government departments and fire fighting authorities because of it's efficiency, durability, and exceptional performance.

Other high pressure self priming centrifugal pumps in the Aussie range include big 4" pumps that deliver up to 1400 litres per minute, with heads of up to 70 metres.

What's common in all these pump designs is the closed style impellers. The diffuser used with the closed impeller is also more compact than a normal volute, in order to generate higher discharge pressures.

The Fire Chief, and it's big brother the Aussie Mr. T twin impeller fire fighting pump are available with a wide range of ports that include 1½", 2", 2½" and 3". A unique 3 outlet discharge port is standard equipment, allowing the operator real versatility.

High pressure pumps with closed impellers are not designed for handling solids or sandy water. Silt, sand or debris will clog pump internals if allowed to enter the casing. A good quality strainer, preferably not a foot valve, is mandatory in using this style of pump.

Closed impeller pumps are not recommended for pumping abrasive materials.

If the pump is used in an application where water is known to be dirty, it is recommended that a fine mesh net be fitted over the suction strainer to protect the pump.

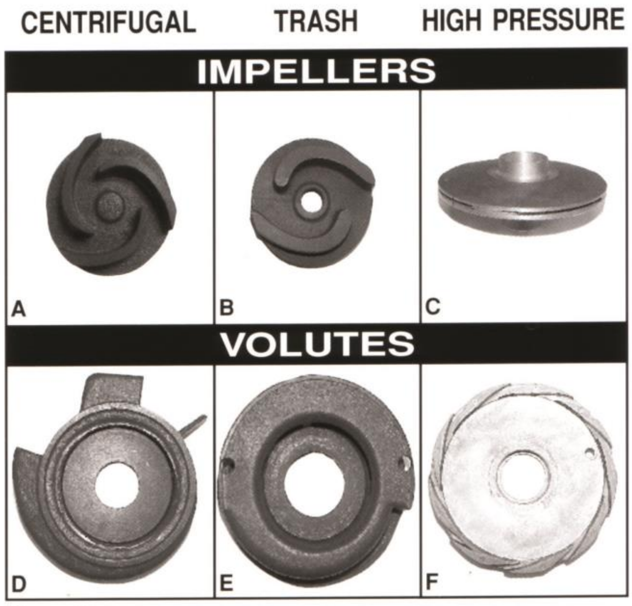
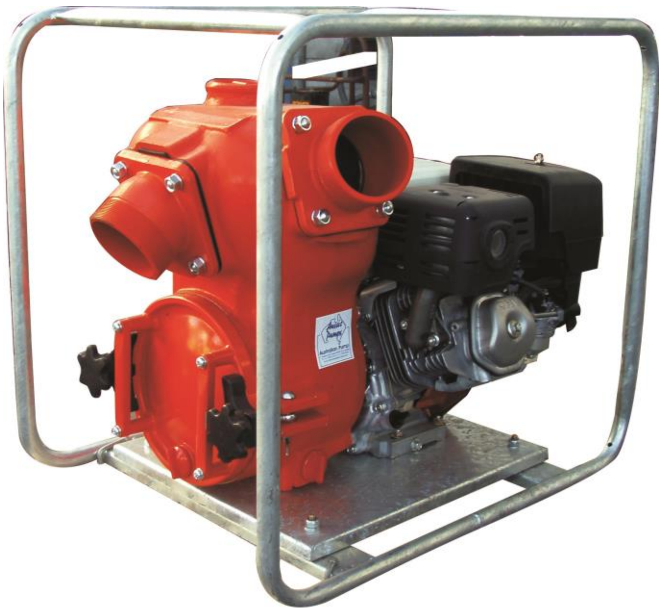


Figure 4

TRASH CENTRIFUGAL PUMPS



Trash pumps get their name from the ability to handle large amounts of debris in suspension. They're preferred by contractors, many water carters and the rental industry because of their reliability, durable and minimal downtime even with difficult liquids. The Aussie range includes 2", 3", 4" and 6" pumps, with flows of up to 6,000 litres per minute and heads as high as 46 metres.

The rule of thumb is that a trash pump will generally handle spherical solids up to ½ the diameter of the suction inlet. Solids (sticks, stones and debris) flow through without clogging making them ideal for the water conditions typically found on job sites. Trash pumps handle up to 25% suspended solids by volume.

Trash pumps offer another benefit in that they can be quickly and easily disassembled for service or inspection. While standard pumps require special tools that aren't always available the inside of a trash pump housing can be accessed with common tools.

Customers occasionally ask why a trash pump costs more than standard centrifugal pumps. One big reason is that higher horsepower engines are needed for trash pumps. The impeller is a high SG cast iron non-clog style, two vane design with a large cast iron volute that enables the pump to handle a high volume of water and debris. The mechanical seal – like the impeller and volute – is selected for it abrasion resistance and more parts are machined for the casing. While there is a higher initial cost it must be noted that this is recovered through the reduced maintenance over the life of the pump.

AG CHEM, DIESEL AND SALT WATER PUMPS

Farmers are continually faced with the need to have pumping equipment that will handle agricultural chemicals like herbicides, pesticides and more recently new, high-tech liquid fertilizers. Some of these chemicals have adverse reactions with pumps of metal construction as the liquids can be extremely corrosive.

Aussie Poly pumps, manufactured from 30% glass filled polyester can handle most of these difficult liquids with ease. Specialised construction pumps in the range, available in either polyester or Ryton, can even handle high strength industrial chemicals.

A wide range of elastomers are available for precise chemical compatibility. Polyester construction self priming centrifugal pumps are designed for relatively low pressure applications where volumes of liquids need to be transferred efficiently. The pumps can be either petrol or diesel engine driven, bare shaft or close coupled to single phase or three phase electric motors. Even hydraulic drive versions are now common for mounting on agricultural tractors for either transfer or even spray applications.

Navies around the world use the Aussie Seamaster, a Yanmar diesel engine powered version of these unique pumps, for marine fire fighting, salt water salvage and diesel transfer. These pumps are equipped with Buna N seals and o-rings because of their compatibility with both salt water and oil based products like diesel fuel.

For more detailed application data, ask your local dealer for a copy of the chemical compatibility chart.

HIGH PRESSURE DIAPHRAGM PUMPS

The Aussie Headmaster range of positive displacement diaphragm pumps offer pressures of up to 50 bar (500 metres) and flows as high as 150 litres per minute. They're ideal for transferring water over long distances, or up steep inclines and can be used for spraying, machine wash down, high pressure transfer, and even fire fighting.

The product range is available with either close coupled gearbox drive, or PTO version for running off the power take off of agricultural tractors.

Diaphragm pumps have major limitations in self priming, compared to an Aussie Quik Prime pump. Suction is generally limited to around 1½ to 2 metres, but their efficiencies are excellent, enabling high volumes to be pumped at high pressure with very effective use of available horsepower.

This innovative Aussie pump product is finding it's way into unusual applications that include mining plant and agricultural equipment wash down, and even chicken shed disinfecting and clean out.

Aussie Headmaster diaphragm pumps are not designed for pumping dirty water, and should be used with a good quality filter, with mesh screen where necessary.

PUMP TERMINOLOGY

As with any field working with pumps requires an understanding of the terminology common to their applications.

It was explained earlier that pumps lift water with the aid of atmospheric pressure then pressurize and discharge it from the casing. The practical suction lift, at sea level, is 7.6 metres. The published specifications of most pump manufactures will list this as maximum suction lift.

Pump performance is measured in volume as litres per minute and in pressure as head in metres. In general, a trade off occurs between head and flow with an increase in head causing a decrease in flow or visa versa.

Head refers to gains or losses in pressure caused by gravity and friction as water moves through the system (Figure 6). It can be measured in lbs/in^2 (PSI) but is most commonly listed in metres of water in published specifications.

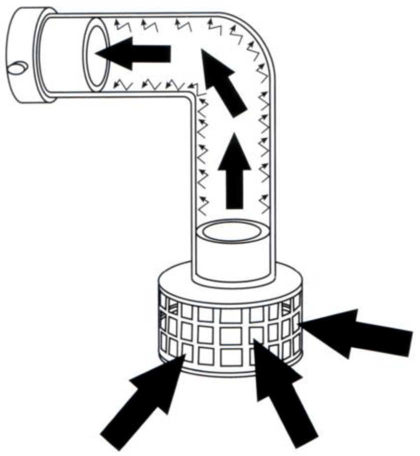


Figure 6 — Friction Loss

To illustrate, consider an Aussie Quik Prime 3" trash pump is rated with a maximum head of 27 metres. A pump must produce 1 PSI to push a column of water vertically 0.7 metre. Therefore dividing the maximum head rating of a pump by 0.7 will provide the maximum pressure capability of the pump.

Depending on how the measurement is taken suction lift and head may also be referred to as static or dynamic. Static indicates the measurement does not take into account the friction caused by water moving through the hose or pipes. Dynamic indicates that losses due to friction are factored into the performance. The following terms are usually used when referring to lift or head.

Static Suction Lift – The vertical distance from the water line to the centerline of the impeller.

Static Discharge Head – The vertical distance from the discharge outlet to the point of discharge or liquid level when discharging into the bottom of a water tank.

Dynamic Discharge Head – The static suction lift plus the friction in the suction line. Also referred to as Total Discharge Head.

Total Dynamic Head – The Dynamic Suction head plus the Dynamic Discharge Head. Also referred to as Total Head.

PUMPING FACTORS

The altitude at which a pump is operated will enhance or diminish it's performance. At higher elevations atmospheric pressure is decreased reducing suction lift. For this reason the pump should be located as close to the water source as possible. Table 1 shows suction lift at several elevations.

TABLE 1 – Suction Lift At Various Elevations

Altitude	Suction Lift In Metres			
Sea Level	3.0	4.5	6.1	7.6
600m	2.7	4.0	5.3	6.7
1,200m	2.4	3.5	4.7	5.9
1,800m	2.1	3.2	4.2	5.2
2,000m	1.9	2.8	3.8	4.7
3,000m	1.7	2.6	3.5	4.3

Altitude affects engine performance as well. A rule of thumb is that gasoline and diesel engines will lose 3% of their power for every 300 metres of elevation. This is due to the "thinner air" or lack of oxygen at higher altitudes. The reduced engine speed results in reduced flow and head. Table 2 shows percentage drops in performance as elevation increases.

Many engine manufactures offer methods of overcoming this loss by offering high altitude cylinder heads, as well as carburetor jets and air cleaners designed for use at higher elevations.

TABLE 2 – Performance Loss At Various Elevations

Altitude	Discharge Flow	Discharge Head
Sea Level	100%	100%
600m	97%	95%
1,200m	95%	91%
1,800m	93%	87%
2,000m	91%	83%
3,000m	88%	78%

Water temperature and suction lift have an inverse relationship. As water temperature increases the practical suction lift will decrease, because warm water contains more entrained air, causing the pump to lose its ability to prime. If the water is too warm, it may be necessary to locate the pump below the water level. This creates a net positive suction head (NPSH). Always be cautious when pumping hot water, as it can damage your pump. It is advisable to contact the pump manufacture to determine the maximum operating temperature.

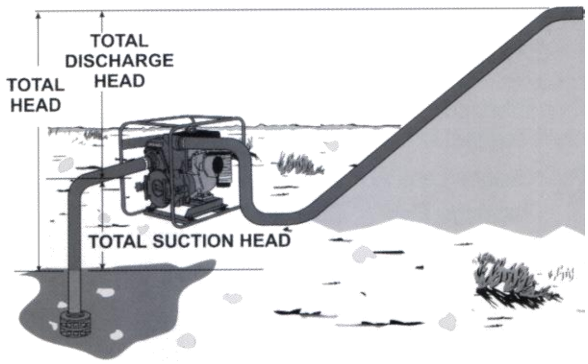
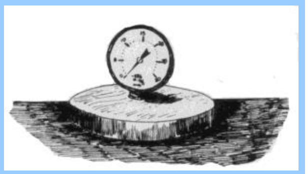


Figure 7

THE VACUUM TEST

Each time the pump is returned from a job, it is wise to run a simple vacuum test to determine the pumping and priming capabilities of your equipment. This test takes only a few seconds to run, and in no way requires a skilled technician.

To perform the vacuum test, the pump case should be filled with water and a small amount of grease applied to the rubber face of the vacuum gauge. This discharge port should be open and free of obstruction. After the engine has been started and brought to the proper RPM, simply apply the vacuum gauge assembly to the suction opening. In a few seconds, a vacuum will start to develop and the gauge should remain in position during the test.



If the vacuum gauge reads 625mm then rest assured that the pump is capable of lifting water 7.5metres (assuming that the suction hose and fitting are correctly applied). If this test is performed each time a pump is sent out on a job, you can prove the pump's ability to prime before hand.

If the pump has been checked and it pulls 625mm of vacuum, then the problem will be elsewhere and you should refer to Pump Troubleshooting Guide.

SELECTING THE PROPER PUMP FOR TYPICAL CONDITIONS … A GUIDE

Application	High flow centrifugal	High pressure centrifugal	High pressure diaphragm	Self priming trash
Clear Water	x			
Slimy Water	x		x	x
Mucky Water	x		x	x
Mud Water	x		x	x
Silt Water	x		x	x
Abrasive Water	x		x	x
High Solid Content Water			x	x
Slow Seepage Ditch Water			x	
Fast Seepage Ditch Water	x			x
Septic Tanks			x	x
Man Holes	x			x
High Pressure Transfer		x		

PUMP TROUBLESHOOTING GUIDE

If your pump is not functioning properly, the following list may aid you in determining the problem.

IF THE PUMP DOES NOT DELIVER ENOUGH WATER:

- Engine may not be running at the rated speed
- Strainer, inlet valve or the suction line may be clogged
- Suction line or fitting may leak air
- Mechanical seal may be worn and leaking air or water. Check weep hole
- There may be too much clearance between impeller and the volute due to wear. For best performance refer to manufacturer's recommendations created by the pump
- Suction lift may be too high. At a 7.6m lift the pump delivers only about 50% of the water it delivers at a 3m lift.
- The suction hose may be too long, causing excessive friction loss and reducing pump capacity.
- Discharge head may be too high. Check hose or pipe friction losses. A larger hose or pipe may correct this condition

IF THE PUMP DOES NOT DEVELOP ENOUGH PRESSURE:

- Engine may not be running at it's rated speed
- Mechanical seal may be leaking. Check weep hole
- There may be too much clearance between the impeller and pump body or volute due to wear. For good performance, refer to the manufacturer's instruction for proper adjustment.

IF THE PUMP DOES NOT PRIME CORRECTLY:

- Make sure that the pump casing is filled with water
- Look in the suction line or fittings. Check to see that all fittings are tight in the suction line and make sure there is no leak in the hose itself.
- Mechanical seal may be worn and leaking air
- Inlet valve rubber may be frozen to the seat
- Pump may be running too slowly
- The clearance between the impeller and pump body or volute may be greatly worn. Refer to the manufacturer's instruction manual for proper adjustment
- Suction lift may be too high. At sea level the pump should not be used on lifts in excess of 7.6m from the level of the water to the center of the impeller. Keep the pump as close to the water source as is safely possible
- Suction line or suction strainer may be clogged
- Water may be too warm for the suction lift being used (as the temperature of the water increases above 15°C, the practical suction lift will decrease) making priming difficult. It may be necessary to replace the water in the pump case with fresh cold water

MAKING YOUR PUMP LAST

The following check list will help you to keep your pumps in top condition. Check the following points on a **monthly** basis:

- Priming speed
- Capacity
- Noise in pump casing
- Gaskets and O-rings
- Shaft seals leakage of air of water
- Hose, hose washers and suction strainer

Engine check list

Check monthly or more frequently depending on application i.e. water cart in constant use or continuous dewatering or irrigation job.

- Crankcase oil level
- Spark plug condition
- Air cleaner
- Unusual engine noise
- Proper RPM
- Carburetor adjustment

Every six months, check the impeller for wear, and for clearance between the impeller face and the volute. Refer to the manufacturer's recommendations. Check the shaft seal for wear, as well as the shaft sleeve. Clean the casing and volute passages.

PUMP STORAGE TIPS

(For Aussie Pump users in cold climates i.e. Northern Europe or North America)

Drain the pump casing completely of water to prevent damage from freezing
If complete draining is not possible, pour a small amount of anti-freeze into the casing and rotate the pump shaft to ensure mixing
Seal suction and discharge ports to prevent the entry of debris or other foreign material
If the pump has an oil lubricated seal, drain the oil from the seal cavity and refill with 30 weight non detergent motor oil
For water cooled seals, place one half pint of lubricating oil (new or used) through the discharge opening in the pump and turn the engine over several times. This will prevent excessive corrosion and also will keep the mechanical seal lubricated.

Caution!

- If flexible hose is laid across a roadway protect it with planking. Instantaneous shut off pressure is applied when a vehicle runs across an unprotected hose and will cause 'hydraulic shock'. This can damage the pump and/or the hose.
- A relief valve should be used to avoid 'hydraulic shock' if sudden "shut off" cannot be avoided.
- Do not use QP Pumps with pressure feed e.g. from a fire hydrant.

Installation Tips

Location

The pump should be located as near as possible to the liquid to be pumped and in no case should the pump be more than 7m (23 feet) above the surface of the liquid supply. The pump should always be as level as possible.

Suction System

Pipe or hose must be self supporting without adding stress to pump body. If a hose is used, it should be of the reinforced type to prevent collapsing under vacuum. All suction system pipe or hose and connections must be free of air leaks, as even a very slight leak will greatly reduce pumping efficiency and priming ability. The pump should be installed with the trash strainer on the suction line to prevent oversize solids from being drawn into the suction system.

Aussie Pump – Pump Terminology

Air Bound – A condition occurring when a centrifugal pump body is filled with air and a vacuum can no longer be formed allowing water to flow into the pump.

Capacity is the water handling capability of a pump commonly expressed as litres per minute (LPM) or litres per hour (LPH)

Cavitation is a phenomenon causing vacuum pockets to form within the pump that eventually implode under pressure pitting the impeller and volute surfaces.

Check Valve (Flapper Valve) – Rubber molded around a steel weight that seals off the inlet or outlet preventing water from either entering or exiting the pump

Cleanout Covers – On trash pumps a removable cover that allows easy access to the interior of the pump casing for removal of any debris.

Dewatering – The removal of unwanted water–clear or dirty but free from hazardous material

Diffuser – A stationary housing similar to a volute in which the impeller rotates. Compact in design, it enables the pump to produce higher heads / pressures.

Discharge Hose – A collapsible hose used to move the water discharged from the hose.

Discharge Port – Same as the outlet. The point where the discharge hose or pipe is connected to the pump

Drain Plugs – Removable plugs used to drain water from the pump during periods of inactivity

Dynamic takes into account motion, as opposed to static.

Frame – A wraparound tubular steel frame provides protection for the casing and engine. These frames can simplify storage (stacking) and lifting

Friction Loss refers to reductions in flow due to turbulence as water passes through hoses, pipes, fittings and elbows.

Hazardous Material – Any volatile, explosive or flammable liquid that requires handling and should not be used with a dewatering pump.

Head – A measurement of pressure typically expressed in metres or BAR

Impeller – A disk with multiple vanes. It is attached to the pump engine or motor and is used to create centrifugal force necessary for moving water through the pump casing.

Mechanical Seal – A common wear part that forms a seal between the pump and the engine or motor. Also prevents water from seeping into the engine or motor.

Net Positive Suction Head (NPSH) – Positive flow of water to the suction port of a pump

Performance Curves – Chart water flow by comparing total head to flow rate.

Prime – The creation of a vacuum inside the pump casing

Self Priming – The ability of a pump to purge air from it's system and creating an area of low pressure that permits water to flow into the pump casing.

Shock Mounts – Rubber mounts used to dampen vibration from the engine and help prevent the pump from "walking away"

Skid Mount – Pump and engine mounted on a base

Slow Seepage – Water that drains slowly into a trench or work area from the surrounding areas. Possible caused from run off or high water tables.

Solids – Any particulate that passes through the pump: mud, sand, rock or other debris.

Static acting by weight not motion, as opposed to dynamic.

Strainer – A fitting at the end of the suction hose that prevents solids from entering the pump larger than what it is capable of passing

Suction Hose – A reinforced hose used through which water flows into the suction end of the pump.

Suction Port – Same as the inlet. The point where the suction hose or pipe is connected to the pump.

System – the network of hoses, pipes and valves linked to the pump.

Thermal Overload Sensors – A feature built into the electric motor of submersible pumps that shuts it down should the operating temperature becomes too high.

Viscosity – The resistance to flow of a liquid at a given temperature. High viscosity liquids such as motor oil are more resistant to flow than water.

Volute – A stationary housing inside the pump housing in which the impeller rotates. It is used to separate air and water.

Water Hammer – Energy transmitted from a sudden stoppage in the flow of water out of the pump.

Wear Plate – A replaceable steel insert that fits inside the volute or suction cover of a pump. Helps to form a vacuum with the impeller and reduce the cost of replacement parts.

Weep Hole – A small opening on the underside of the pump where it is joined to the engine. Allows quick detection of a leak before water seeps into the oil sump of the engine.

AUSSIE PUMP SELECTION GUIDE

Size	QP1	QP105	QP154	QP207	QP209	QP303	QP205SE or QP205SL	QP205SLT	QP310	QP402	QP310SL	QP402SL	QP203T	QP301T	QP40T	QP60TD	2" Poly	3" Poly
	(1"x1")	(1"x1")	(1½"x1½")	(2"x2")	(2"x2")	(3"x3")	(2", 2x1", 1x1½")	(2", 2x1", 1x1½")	(4"x3")	(4"x4")	(4"x3")	(4"x4")	(2"x2")	(3"x3")	(4"x4")	(6"x6")	(2"x2")	(3"x3")
Head/Flow (m / lpm)	42/110	60/110	60/210	30/600	33/800	32/1000	80/500	95/480	28/1600	28/1800	50/1350	50/1500	27/600	24/1200	24/1800	27/3850	25/835	25/1010
Semi trash solid size	-	-	-	-	-	-	-	-	-	-	-	-	0.75"	1"	1.5"	2"	-	-
Water transfer	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓					✓	✓
Diesel transfer		✓	✓		✓	✓	✓										✓	✓
Fire fighting							✓	✓										
High head transfer							✓	✓			✓	✓						
Tanker truck filling					✓	✓			✓	✓	✓	✓						
Water tanker/spray					✓	✓	✓		✓	✓	✓	✓						
Emergency marine fire fighter							✓	✓			✓	✓					✓	✓
Dirt water													✓	✓	✓	✓		
Dam emptying													✓	✓	✓	✓		
Liquid farm waste													✓	✓	✓	✓		
Septic tank emptying													✓	✓	✓	✓		
Mine dewatering															✓	✓		
Ag chemicals																	✓	✓
Typical Customers																		
Councils	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊		
Farmer/Ag	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
Wineries	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
Water carters					◊	◊	◊	◊	◊	◊	◊	◊						
FESA fire fighting, tanker filling					◊	◊	◊	◊	◊	◊	◊	◊						
Hobby farmers	◊	◊	◊	◊	◊	◊	◊										◊	◊
Urban/rural households		◊	◊		◊	◊	◊	◊					◊					
Mining	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
Waste handlers													◊	◊	◊	◊		
Waste depots													◊	◊	◊	◊		
Quarries													◊	◊	◊	◊		

RELIABLE PRODUCTS … RELIABLE PEOPLE

USEFUL INFORMATION

FLOW				
Litres per minute	Litres per second	Cubic metres per hour	Gals per hour	Gals per minute
1	0.0167	0.06	13.2	0.22
60	1	3.6	792	13.2
16.67	0.278	1	220	3.67
0.0758	0.00127	0.0045	1	0.0167
4.546	0.076	0.2728	60	1

PRESSURE / HEAD				
Metres of water	KPA	Atmosphere or bar	PSI	Feet of water
1	9.807	0.098	1.42	3.28
0.102	1	0.01	0.145	0.335
10.21	100	1	14.5	33.5
0.703	6.895	0.068	1	2.31
0.305	2.984	0.03	0.433	1

VOLUME				
Litres	Cubic Metres	IMP. Gals	US Gals	Cubic Feet
1	0.001	0.22	0.264	0.0353
1000	1	220	264	35.3
4.546	0.0045	1	1.2	0.1605
3.785	0.0038	0.833	1	0.1337
28.32	0.0283	6.23	7.48	1

LENGTH				
Metres	CMS	Yard	Feet	Inches
1	100	1.0936	3.28	39.37
0.01	1	0.01094	0.328	0.3937
0.9144	91.44	1	3	36
0.3048	30.48	0.3333	1	12
0.0254	2.54	0.0278	0.0833	1

QUICK CALCULATIONS

(M) HEAD x 1.42 = PSI
KPA / 10 = (M) HEAD
LITRES x 4.546 = IMPERIAL GALLONS
PSI x 6.895 = KPA
FT x 0.433 = PSI

KPA x 0.145 = PSI
PSI x 2.3 = FT
BAR x 10.29 = METRES
BAR x 14.5 = PSI
(M) CUBED / HOUR x 16.67 = LPM

FRICTION LOSS DATA

Pipe friction loss for class 9 UPVC pipe AS12477 (M HEAD / 100 METRES LENGTH PIPE)

FLOW LPM	NOMINAL PIPE SIZE M / M							
	25 (1")	32 (1 1/4 ")	40 (1 1/2 ")	50 (2")	65 (2 ½")	80 (3")	100 (4")	125 (5")
2.5	0.030							
5	0.090	0.030	0.014					
10	0.310	0.120	0.055	0.019				
20	1.100	0.420	0.190	0.070	0.244			
25	1.700	0.630	0.300	0.110	0.035	0.180		
30	2.400	0.890	0.140	0.150	0.050	0.024		
40	3.800	1.400	0.630	1.230	0.078	0.038		
50	5.900	2.100	0.970	0.370	0.120	0.059	0.016	
60	8.300	3.000	1.400	0.500	0.160	0.079	0.022	
75	12.000	4.500	2.100	0.730	0.250	0.120	0.033	0.015
100	20.000	7.400	3.400	1.200	0.410	0.200	0.053	0.024
125	29.000	11.000	5.200	1.800	0.590	0.300	0.083	0.037
150	42.000	15.000	7.100	2.600	0.850	0.410	0.110	0.048
175	57.000	21.000	9.500	3.500	1.100	0.54	0.150	0.067
200	72.000	27.000	12.000	4.500	1.500	0.700	0.200	0.085
225	81.000	24.000	15.000	5.500	1.700	0.860	0.250	0.100
250	104.000	41.000	18.000	6.600	2.000	1.000	0.300	0.120
275		48.000	21.000	7.700	2.500	1.200	0.340	0.150
300		56.000	25.000	8.900	3.100	1.400	0.400	0.180
325		66.000	29.000	10.000	3.500	1.600	0.460	0.200
350		77.000	33.000	12.000	4.000	1.800	0.530	0.230
375		84.000	37.000	13.000	4.500	2.100	0.600	0.260
400		91.000	42.000	15.000	5.100	2.400	0.680	0.290
425		100.000	48.000	17.000	5.700	2.700	0.750	0.330
450		110.000	53.000	19.000	6.400	3.100	0.820	0.360
475		118.000	58.000	20.000	6.800	3.300	0.900	0.390
500			63.000	22.000	7.300	3.500	0.980	0.420
550			73.000	26.000	8.800	4.200	1.200	0.490
600			84.000	31.000	10.000	4.800	1.400	0.560
650			95.000	35.000	11.000	5.500	1.600	0.650
700			109.000	41.000	13.000	6.400	1.800	0.750
750				47.000	15.000	7.300	2.000	0.870
800				52.000	17.000	8.300	2.400	.0940
850				57.000	19.000	9.100	2.600	1.000
900				61.000	21.000	10.000	2.800	1.100
950				66.000	23.000	11.000	3.200	1.300
1000				74.000	25.000	12.000	3.500	1.400

FRICTION FACTORS DUE TO PIPE FITTINGS

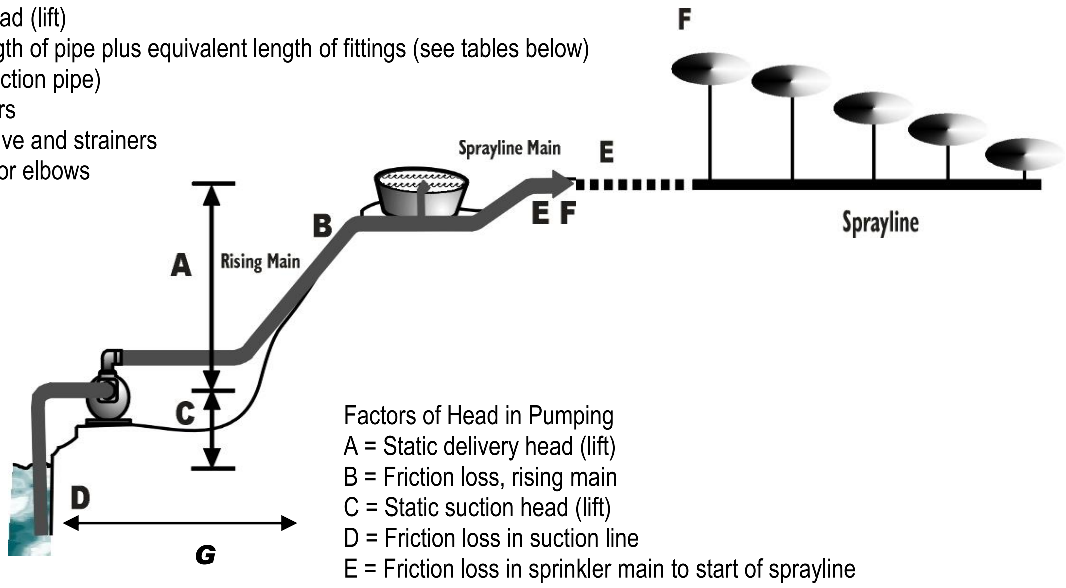
Establish the number of fittings and their equivalent pipe lengths. Add this to pipe length and use adjacent table to determine friction loss

Friction Loss		PIPE FITTINGS				
Size (mm)	Foot/ check valve	Reducer (2/1)	90° Elbow	90° Bend	Gate valve	Standard Tee
20	9	0.23	0.5	0.4	0.13	1.4
25	10	0.28	0.8	0.5	0.17	1.8
32	12	0.36	1	0.6	0.22	2.2
40	15	0.46	1.3	0.8	0.28	2.8
50	20	0.57	1.6	1	0.35	3.5
80	31	0.8	2.5	1.6	0.56	5.5
100	40	1.2	3.3	2	0.7	7

FRICTION FACTORS

Suction head (lift) and Delivery head (lift)
Friction head: calculated from length of pipe plus equivalent length of fittings (see tables below)

- Length of pipe (including suction pipe)
- Equivalent length of reducers
- Equivalent length of foot valve and strainers
- Equivalent length of bends or elbows
- Equivalent length of valves



Factors of Head in Pumping
A = Static delivery head (lift)
B = Friction loss, rising main
C = Static suction head (lift)
D = Friction loss in suction line
E = Friction loss in sprinkler main to start of sprayline
F = Pressure required at start of sprayline
G = Pipe length to calculate B friction loss from table

Total head for sprayline operation = A + B + C + D + E + F

SELF PRIMING PUMPS: Aussie Quik-Prime pumps are of a self priming centrifugal design. They have excellent priming characteristics and don't need foot valves in order to prime. Almost all pumps in the range prime to in excess of 7 metres, some to 8 metres. Self priming means that the operator does not have to fill the entire suction line before start up. All that is required is to fill the pump casing with water, start the pump and ejection of the water in the pump creates a vacuum which, working in conjunction with atmospheric pressure, causes water to be drawn up the suction line.

SUCTION LINE: Please note the entire suction line must be air tight. Suction lift is accomplished by developing a negative pressure at the pump intake. Thus atmospheric pressure applies the positive lifting force. Avoid sharp bends in the suction line and ensure that no part of the pipe is above pump level. Always reduce suction lift to the minimum. Suction lines must be large enough to minimise friction loss.

DIESEL DRIVE: Diesel engines have more torque but run slower than petrol engines. Diesel pumps shown are rated at 3600rpm. For continuous service run at 3000rpm.

Example of pump selection;

Require engine drive pump to transfer water from a dam a horizontal distance of 200m to a storage tank up an incline of 10m through 50mm pipe (2”), height from pump to dam water level 3m.

Known facts: **A** = 10m, **B** = friction loss 200m of 2” pipe@ say 450 lpm = 19 x 2 = 38m (refer to Friction Loss data table)
C = 3m **D** = 3/100 x 19 = 0.57m **E** = n/a **F** = n/a
Therefore total head is A+B+C+D+E+F = 51.37m

Based on this head a high head pump is required, see page 5, i.e. QP205SE/GX200, 2”x2” pump, max head 75m, max flow 450 lpm.

@51.57m this pump will have a flow into the tank of approx 180 lpm

Effects of friction loss if 80mm (3”) line were to be used. Total head required would be as follows:

Known facts: **A** = 10m, **B** = friction loss 200m of 3” pipe@ say 450 lpm = 3.1x 2 = 6.2m (refer to Friction Loss data table)
C = 3m **D** = 3/100 x 3.1 = 0.093m **E** = n/a **F** = n/a
Therefore total head is A+B+C+D+E+F = 19.293m

Flow with the same pump fitted with 3” suction and 3” discharge, i.e. QP305/GX200 will have a flow into the tank of approx 350 lpm.

PUMP REQUIREMENT QUESTIONNAIRE

Selecting the right pump for the job is essential

Your Aussie Pumps Gold Distributor is a water specialist with staff trained in the principles of pump operation and pump selection. When you visit your Aussie Pumps Gold Distributor, seeking advice on a pump or water supply system, it will assist if you have taken a few minutes to gather some basic information on your requirements.

Fill in the answers to the questions below in the spaces provided (tick boxes when appropriate)

1. For what purpose do you require a water pump?
   - ☐ Garden watering / sprinklers
   - ☐ Household water pressure system
   - ☐ Water transfer
   - ☐ Hosing down
   - ☐ Tank filling
   - ☐ Fire fighting
   - ☐ Tanker pump
   - ☐ Other (Specify) ....

2. From what source of supply is the water to be drawn?
   - ☐ River, creek, channel
   - ☐ Dam
   - ☐ Underground tank
   - ☐ Above ground or rainwater tank

4. State if the water supply is ☐ Clean ☐ Muddy ☐ Gritty

5. How far down (vertically) from the pump to the water level itself (point **C** on diagram)? ....m

6. How long is the suction pipe (point **D** on the diagram)? ....m

7. Diameter of the suction pipe is ....mm Type of pipe is ....

8. How far along does the pump have to push the water to the outlet (point **G** on diagram)? ....m

9. How far up does the pump have to push the water to the outlet (point **A** on diagram)? ....m

10. Diameter of the discharge pipe is ....mm Type of pipe is ....

    Total flow required .... litres / min

12. If known, what pressure is required at the outlet ....BAR

13. Type of pump required (Tick boxes as appropriate)
    - ☐ Automatic pressure system
    - ☐ Trash pump
    - ☐ Engine driven pump
    - ☐ Effluent waste pump
    - ☐ Belt drive without engine
    - ☐ Sump pump
    - ☐ High pressure
    - ☐ HP positive displacement pump
    - ☐ Hydraulic drive
    - ☐ Other (Specify) ....

14. If electric pump, what type of power supply?
    - ☐ Single phase 240 volt 50Hz
    - ☐ Three phase 415 volt 50Hz
    - ☐ Other (Specify) ....

AUSTRALIAN PUMP

AUSTRALIAN PUMP INDUSTRIES PTY LTD **A.B.N. 79 061 619 234**
7 Gladstone Road, Castle Hill NSW 2154 Australia
PO Box 6164, Baulkham Hills BP NSW 2153
P: +61 2 9894 4144 F: +61 2 9894 4240
info@aussiepumps.com.au
www.aussiepumps.com.au