Water Powered Technologies

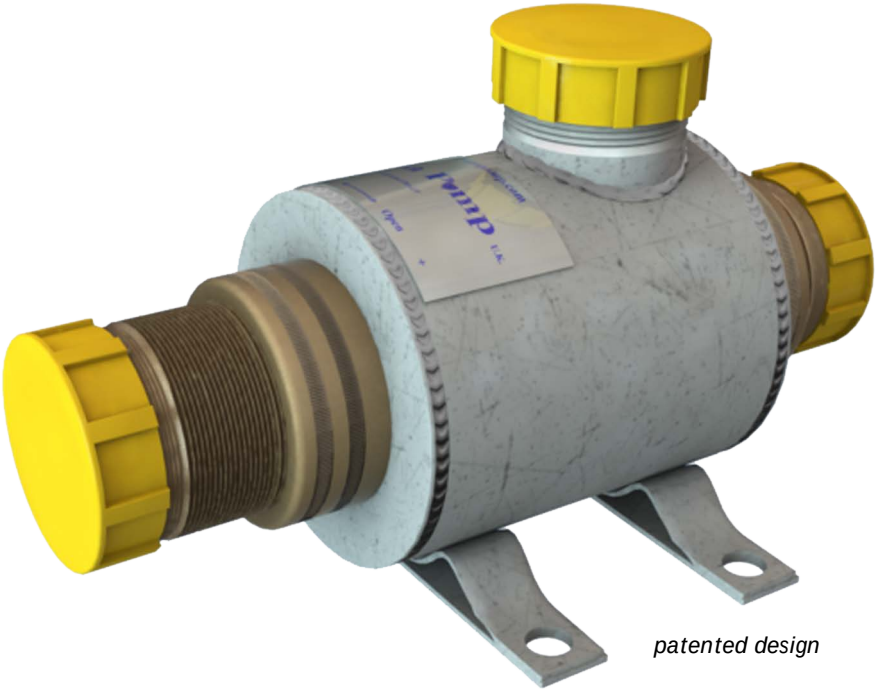
We are Water!

a great UK design

Papa Pump®

MANUAL

Installation, Operation and Maintenance



patented design

Index

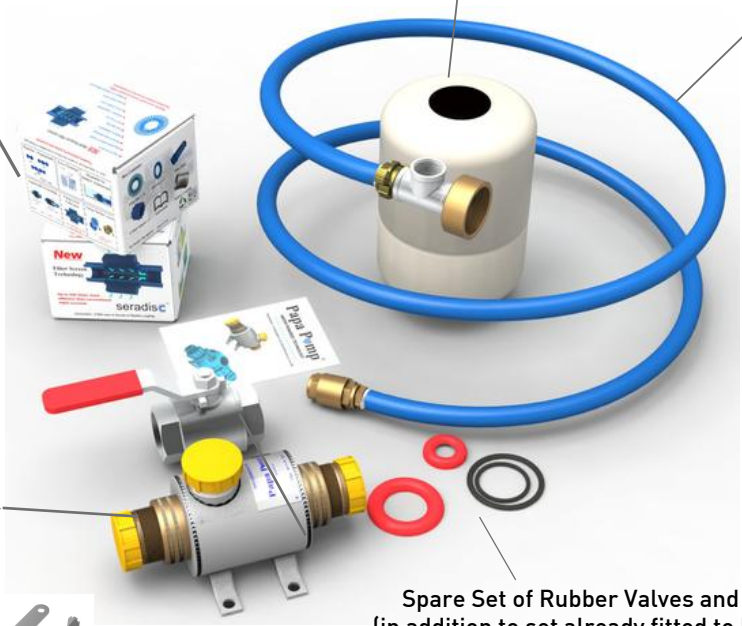
The Papa Pump Kit

The Papa Pump Kit comes in a box weighing only 17kg and includes the following kit contents:

2 x Seradisc Filters
(with adapters)

8 litre Pressure Vessel

Delivery Hose
Assembly



2" Ball Valve
(Shut Off Valve)

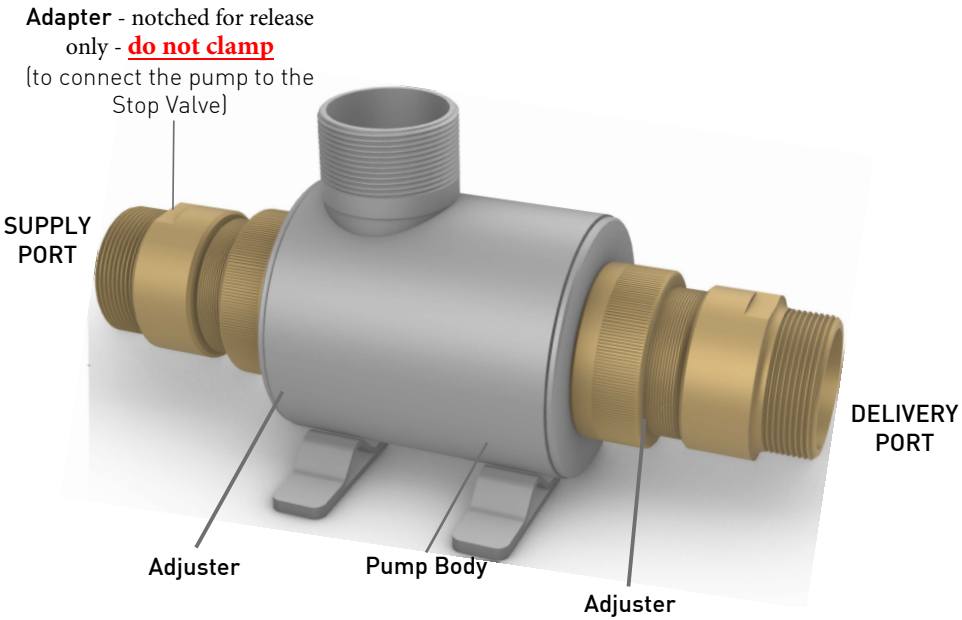
Pump Body

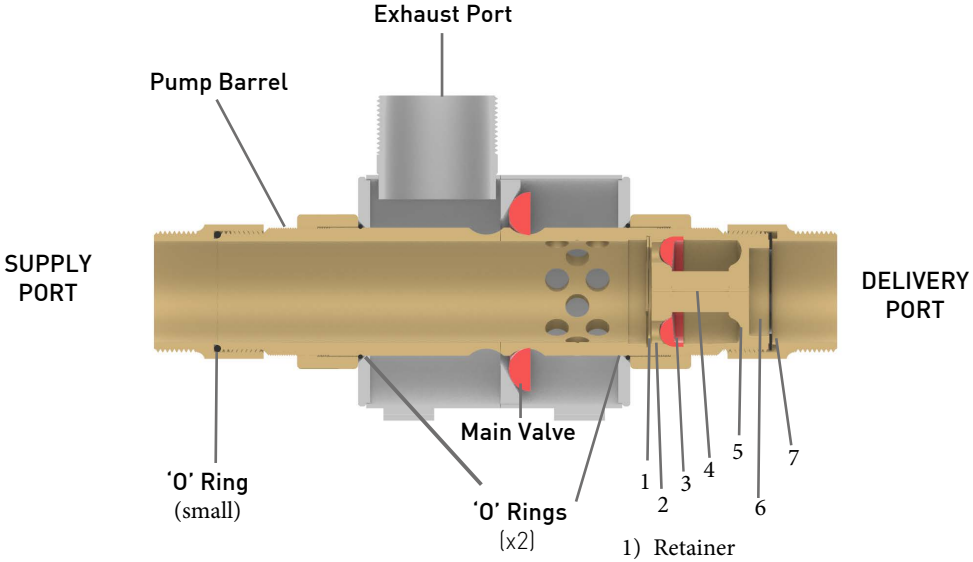
Spare Set of Rubber Valves and 'O' Rings
(in addition to set already fitted to Pump Body)

C-Spanner + bar tool

2 x stainless steel BSPT/NPT Adapters
(Included in kits sold in North and South America)

Pump Parts





1) Retainer
2) Valve Seat
3) NRV Rubber
4) Spigot
5) Valve Seat
6) Spacer
7) Adaptor Seal

What is a Papa Pump?

The Papa Pump is a modern 'hydro ram' based on the principles of a traditional ram pump but with a redesigned and patented new 'Venturi Valve' and manufactured using stainless steel and bronze giving it non-corrosive and incredibly durable properties. The result is a smaller, lighter and more efficient 'Zero Fuel' pump.

The Venturi Valve is an EPDM valve with a profile similar to an aircraft wing which automatically opens and closes, redirecting the water flow to either the delivery port or the exhaust port. The material is also very durable and may last 2 to 3 years of constant use before the valves need replacing.

Zero Fuel pumping allows the pump to run without the use of any fuel or electricity - it just uses the natural power of flowing water, captures it, and uses it to pump water over long distance and to higher elevations.

Main Benefits: Uses no fuel or electricity

Pumps 24/7 without attendance

Little maintenance (inexpensive valves changed 3-4 years)

Uses surface water (doesn't affect ground water levels)

Can make big savings on utility costs

Inexpensive compared with equivalent pump systems

Guaranteed for 5 years

Applications: **Off-grid or remote location free water delivery**

Agriculture - livestock watering and irrigation

Large scale water users (e.g. golf courses, fish farms, etc.)

Water utility applications (water spraying and pulsing)

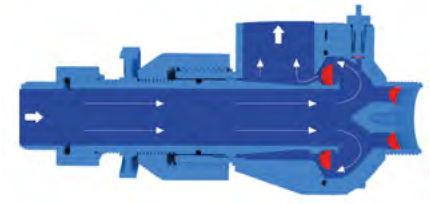
Non potable water (free water for sanitary and cleaning use)

Humanitarian projects (helping developing communities)

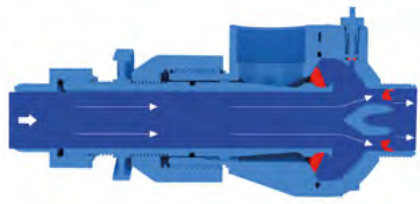
How the Pump works

The valve cleverly redirects the flowing water to go to 2 separate ports - over 70% of the water is de-pressurised and is expelled through exhaust port - up to 30% of the water is pressurised and directed to the delivery port. This higher pressure is what allows it to be delivered over long distances and to higher elevations.

The Pumping Cycle - (Shown on the composite pump - same principal)

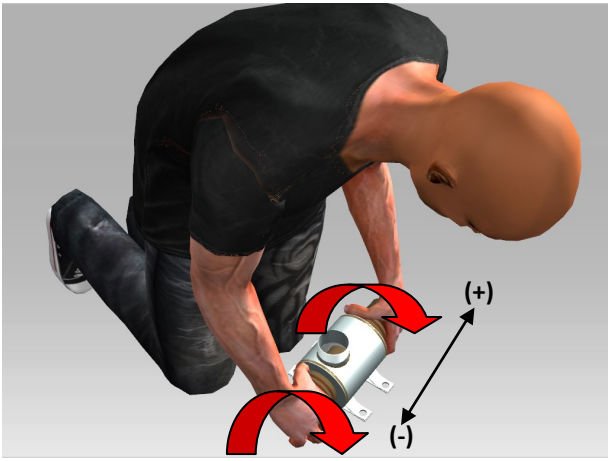


LOW PRESSURE EXHAUST - The water flows around the main valve to the exhaust port. As the flow increases around the main valve a differential pressure occurs causing the valve to close....



HIGH PRESSURE DELIVERY - The flow and pressurised water is then directed through the non return valves at the delivery port. The pressure suddenly reduces, causing the main valve to re-open and the cycle repeats...

Adjusting the Supply Flow



TO ADJUST THE SUPPLY FLOW - If you turn the adjuster as shown, it will increase the flow into the pump. As you do this the beat will get deeper and the pulse will slow. This indicates more water is flowing through the pump, generating a greater pressure and increasing water delivery.

Specifications

	Metal pump	Composite pump
Casing	Stainless steel (304)	Glass-filled nylon (WRAS approved)
Barrel	Bronze	Glass-filled nylon (WRAS Approved)
Seals	EPDM (WRAS approved)	EPDM (WRAS Approved)
Max. output	25,000/24hours	25,000 Litres / 24hours
Max. head (metres)	150+	100
Max. pressure (Bar)	15+	10
Weight (kg)	6.5	2.5
Length (cm)	34	30
Width (cm)	15	18
Height (cm)	17	16

Pipe Friction

Pipe Friction has a minimal effect on the flow of water through the pipes except where there are long distances involved. If you are delivering water over long distances, you should consider pipe friction loss. The loss will depend on the amount of flow, the pipe size (diameter), the pipe material and of course, the length of the pipe. The link below will take you to an quick and easy calculator to work out the friction loss on any long delivery pipe.

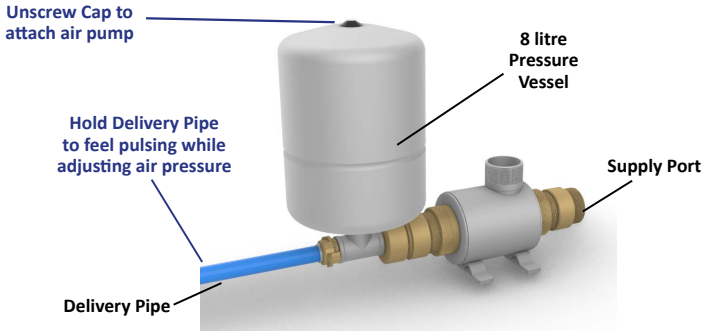
http://www.calculatoredge.com/mech/pipe friction.htm

The Pressure Vessel

An 8 litre Pressure Vessel comes with the Papa Pump Kit. It should be attached to the delivery port and will reduce pulsing in the delivery pipe.

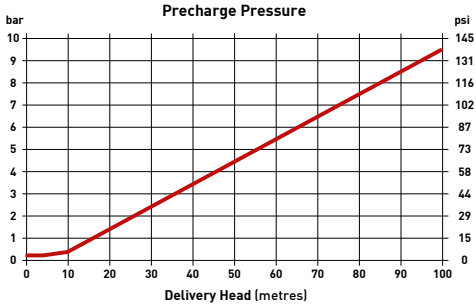
The pressure should be set to 1 bar for every 10 metres of delivery head, less 0.5 bar. For example a 50 metre delivery head would require a pressure of 5 bar less 0.5 bar so the correct pressure would be 4.5 bar.

THE PRESSURE SHOULD BE SET BEFORE ATTACHING TO THE SYSTEM.



Pre-charging the Pressure Vessel

1. Stop the Pump
2. Unscrew the Pressure Vessel **a maximum of 2 turns** to release pressure.
3. When pressure has been fully released, re-tighten the Pressure Vessel
4. Adjust pressure by using an air pump attached to the top of the Pressure Vessel
5. Re-start the Pump



CAUTION! DO NOT FULLY UNSCREW THE PRESSURE VESSEL WHILE PRESSURISED

Stop the pump and unscrew a maximum of 2 turns. Wait until water pressure is fully released before removal.

Watch the video on how to adjust and prime the pressure vessel
https://vimeo.com/248481867

System Layout

Planning your layout is essential to an efficient system and maximising the potential water delivery.

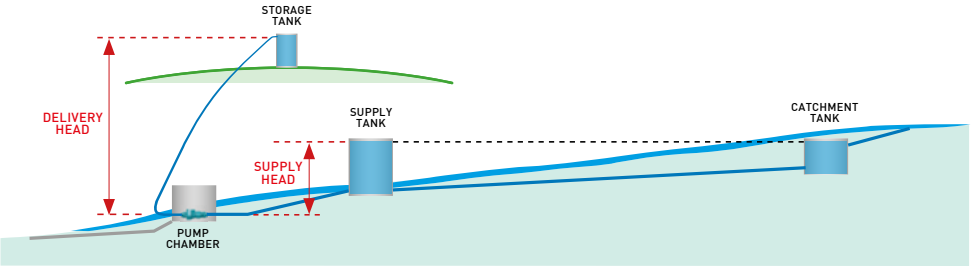
Maximising the Supply Head is most important.

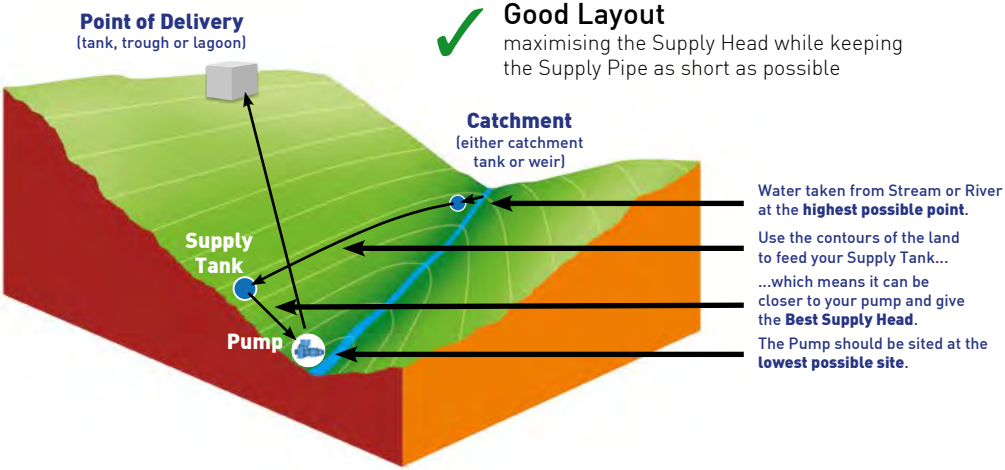
(the difference in height from your supply tank to the pump)

The greater the Supply Head, the more water you can pump.

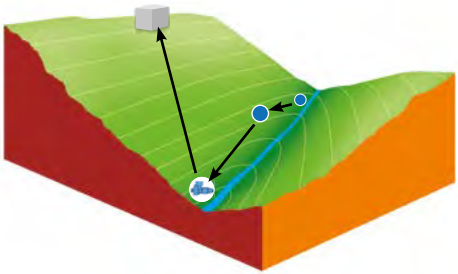
The greater the Supply Head, the higher you can pump it.

Your first task is to find the highest water catchment point and the lowest point you can place your pump to maximise the Supply Head.

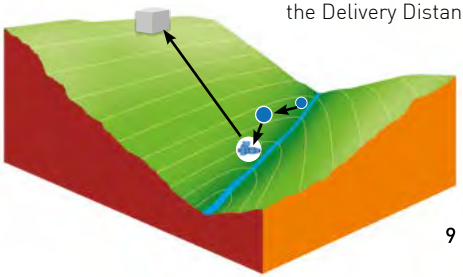




A short (plastic) Feed Pipe and long (metal) Supply Pipe is an inefficient and expensive layout.



Resist placing the pump closer to the delivery point if it means reducing the Supply Head. The Supply Head is much more critical than the Delivery Distance.



Site Measurements

Measuring the Flow of a Stream

There is a minimum flow required for the Papa Pump to operate. You can measure the flow rate from your stream or spring by the following method:

You can use a wide board to dam the stream. Before you place the board across the stream, cut a 'V' shape into the top of the board.

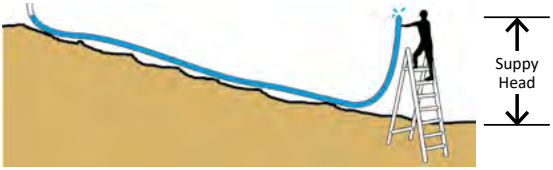
When water flows through the 'V', time how long it takes to fill up a litre jug. E.g., if it takes a second to fill up a litre jug then this equates to 60 litres per minute, which is more than the recommended 60 litres per minute minimum to operate a Papa Pump.

Above is the method to use for a small stream. If you have a larger river, see this pdf on how to measure river flows. Download at **www.waterpoweredtechnologies.com/wp-content/uploads/2018/05/Measuring-Flow-Rate.pdf**

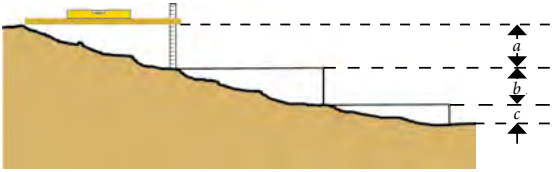
Measuring the Supply Head

A minimum Supply Head of 2 metres is recommended for efficient pumping - contact Water Powered Technologies for advice if you have a small Supply Head (below 2m).

In the absence of professional surveying equipment or an accurate GPS device, there are a few simple methods for measuring your Supply Head:



1. Take a hose pipe and stretch to the point where you can get your maximum Supply Head. Fill the hose with water. At the bottom of the incline, the point at which water starts to come out of the hose is the height you should measure to give you the Supply Head.



2. Use a plank, a measuring stick and spirit level to measure steps down the incline. Repeat until you reach the bottom and then add up your measurements to give you the Supply Head. e.g. $a+b+c$ = Supply Head.

Water Delivery - How much and how high?

The amount of water your Papa Pump System will deliver depends on many variables but the main factors are:

How much water is supplied to the Pump

The height of the Supply Head

The height of the required Delivery Head

The following Pump Performance Chart shows an indication of the amounts of water you can expect based on 60 litres per minute being supplied to a Papa Pump.

Papa Pump Performance Chart

Delivery Flow (litres per day)

(based on 60 litres/min through the Papa Pump)

Water Powered Technologies

Figures shown are amount of water delivered in litres/day

Supply Head (Fall) feet	metres	6 metres / 20 feet	7.5 / 25	9 / 30	12 / 40	15 / 50	23 / 75	31 / 100	46 / 150	62 / 200	77 / 250	92 / 300	123 / 400
100	31									25920	20736	17280	15120
75	23								25920	19008	17280	15120	11232
50	15							25920	17280	15120	12096	10368	7776
40	12							20736	16416	12096	9504	8208	6048
35	11						24192	18144	14688	10368	8208	6912	5184
30	9						20736	16416	12096	9072	6912	6048	4320
25						25920	17280	15552	10368	7776	6048	4752	3456
20	6				25920	20736	14688	12096	7776	6048	4752	3888	2592
15				25920	19008	14688	11232	8640	5616	3888	3024	2592	1728
10	3	25920	20736	17280	13824	11232	6912	5184	3024	2160	1728	1296	864
9		23328	19008	15552	12096	9504	6048	4320	2592	1728	1296	1296	
8		20736	17280	13824	10368	7776	5184	3456	2160	1728	1296	864	
7		18144	14688	12096	8640	6912	4320	3024	1728	1296	864	864	
6	2	15552	12096	9504	6912	5184	3456	2592	1728	1296	864		
5		12096	10368	7776	5184	4320	2592	1728	1296	864			
4		8640	6480	4752	3888	2592	1728	1296	864				
3	1	5184	4320	3456	2592	1728	864	432					
2		3456	2160	1728	1296	864	432						

Contact Water Powere Technologies or your distributor

Delivery Head (Lift)

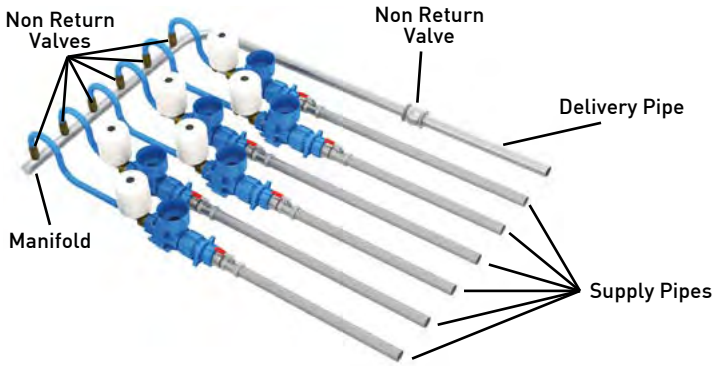
As an example: If you had a supply flow of 60 litres per minute, a supply head of 6 metres, and you wanted to deliver your water to a height of 46 metres, then the amount you could deliver would be 7776 litres per day.

Water Delivery - How Far?

The Papa Pump can pump water for miles! The only loss in pressure is due to pipe friction which is minimal. See page 7.

Using multiple Papa Pumps for larger systems and flows

This is a typical multi-pump configuration.



See how a 5 pump system works for a community in Nepal. Download the case study at **www.waterpoweredtechnologies.com/wp-content/uploads/2018/03/Papa-Pump-Nepal-Case-Study.pdf**

If your supply flow is large and you need more water delivered, you can use a multi pump system. To estimate your delivery flow, use the chart on the previous page and multiply the stated delivery flows by the number of pumps in your system. The table below illustrates some examples.

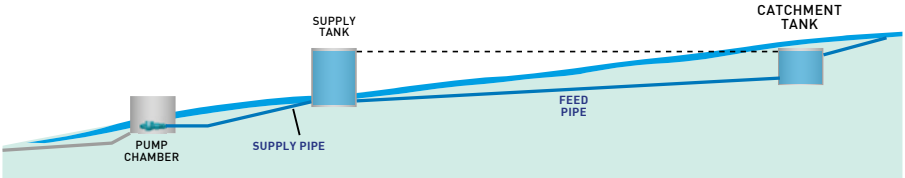
Papa Pump Performance Chart for Multiple Pumps

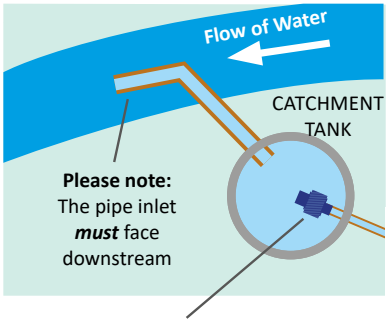
The delivery amounts for multi pump systems are simply the single figure duplicated by the number of pumps, e.g.,

Supply Head (metres)	Delivery Head (metres)	Delivery Amount (litres per day)				
		1 Pump	2 Pumps	3 Pumps	4 Pumps	5 Pumps
1	6	5184	10368	15552	20736	25920
1	12	2592	5184	7776	10368	12960
1	31	432	864	1296	1728	2160
2	6	15552	31104	46656	62208	77760
2	12	6912	13824	20736	27648	34560
2	31	2592	5184	7776	10368	12960
2	77	864	1728	2592	3456	4320
3	6	25920	51840	77760	103680	129600
3	12	13824	27648	41472	55296	69120
3	31	5184	10368	15552	20736	25920
3	77	1728	3456	5184	6912	8640
6	12	25920	51840	77760	103680	129600

Supply Head (metres)	Delivery Head (metres)	Delivery Amount (litres per day)				
		1 Pump	2 Pumps	3 Pumps	4 Pumps	5 Pumps
6	31	12096	24192	36288	48384	60480
6	77	4752	9504	14256	19008	23760
6	123	2592	5184	7776	10368	12960
9	31	16416	32832	49248	65664	82080
9	77	6912	13824	20736	27648	34560
9	123	4320	8640	12960	17280	21600
12	31	20736	41472	62208	82944	103680
12	77	9504	19008	28512	38016	47520
12	123	6048	12096	18144	24192	30240
23	77	17280	34560	51840	69120	86400
23	123	11232	22464	33696	44928	56160
31	62	25920	51840	77760	103680	129600

Water Catchment

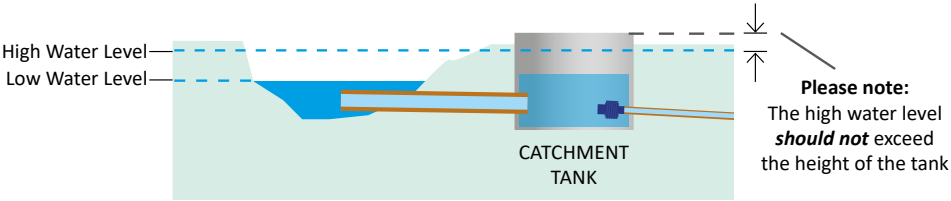




It is highly recommended that a Seradisc Filter is fitted to the Feed Pipe to protect the Pump from debris.

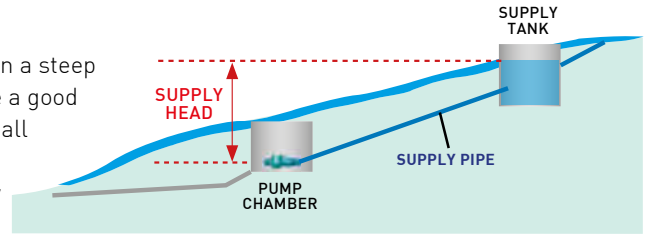
The Catchment Tank (or Weir) acts as the first stage of filtration from large debris and allows the settlement of sediment.

A Catchment Tank is recommended for rivers and streams where there is a great difference between high and low water levels or for small flows (for instance, water from a spring).



When a Catchment Tank is not required.

If the Spring/Stream is on a steep gradient you can achieve a good Supply Head within a small distance. In this case, water can be fed directly to the Supply Tank.



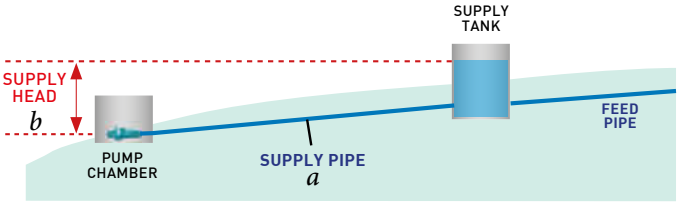
Seradisc Filters are a specially designed high performance filter/screens which will protect your pump from ingress of debris and air. 2 Seradisc Filters are supplied with every Pump Kit.

The Supply Pipe and Supply Tank

All Papa Pump systems require a Supply Tank to regulate the flow into the Pump.

A minimum Supply Head of 2 metres is recommended for efficient pumping - contact Water Powered Technologies for advice if you have a small Supply Head (below 2m). However, there are alternative valve rings that can be used for lower supply heads.

For efficient pumping, the Supply Tank should ideally be close to the Pump Chamber so that the length of the Supply Pipe is between 5 and 7 times the Supply Head. (e.g. If the Supply Head is 2 metres, the Supply Pipe should be between 10 and 14 metres)



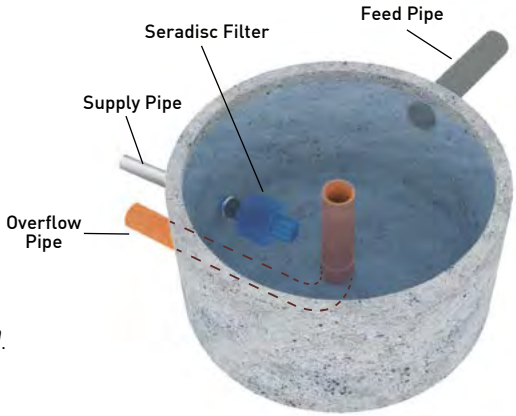
$$a = b \times 5 \text{ (min.) to } 7 \text{ (max.)}$$

The Supply Pipe should be solid - we recommend using **2 inch ⌀ (internal diameter) galvanised threaded Steel Pipe** *(illustrated right)* for this part of the system. **Plastic Pipe will absorb some of the energy and reduce efficiency.**

It is essential that the **pipe is straight and on a consistent gradient**. Bends in the pipe will reduce flow and undulations in the pipe will generate air locks and damage the pump.

For long supply pipe lengths contact WPT for options.

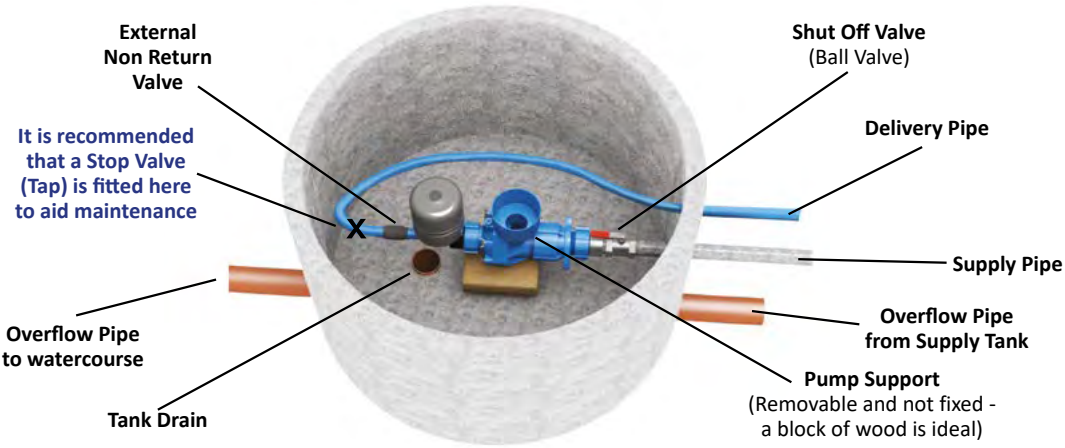
The Supply Tank is a reservoir that regulates the flow to the pump. A concrete ring is the ideal vessel for this but otherwise the tank must be water tight and have enough capacity to supply the pump. A cover or lid will also protect from debris (leaves, etc.) and animals. We recommend fitting a removable stand pipe for overflow and draining for maintenance *(as shown)*.



The Pump Chamber

A 1 metre depth and 1 metre diameter tank can house up to 2 Papa Pumps. If 3 or more pumps are required you will need a bigger chamber. **Cover your chamber to keep free of debris**.

It is important that the supply pipe comes into the tank 150mm off the floor. This is so that you can easily screw on the pump body. Once installed the pump will need then to be supported, but with a temporary support that can be removed for maintenance.



TIP: We recommend, when installing tanks and chambers, that you fit a Conduit Pipe (32mm MDPE) from the top of the Supply Tank to the Pump Chamber, as future proofing for further installations such as a Sureflow Valve.

We recommend using concrete rings wherever possible. However, in some situations, cost and availability can be prohibitive and alternative materials or constructions can be used for your pump chamber.

The important thing is to have enough space to work and also to give the pump some good protection. It is also recommended that a good lid or cover is fitted to keep out debris and animals. It will also suppress any noise from the pump.

Watch the step by step guide on how to install a Papa Pump
https://vimeo.com/242753193

The Seradisc Filters

Good filtration is essential for pump protection. Water Powered Technologies have developed the Seradisc Filter because its screens finer particles, reduces blockages and helps prevent vortexing and cavitation (air formed in the water from turbulence). Good protection for your pump will extend the life of any pump and reduce maintenance costs.

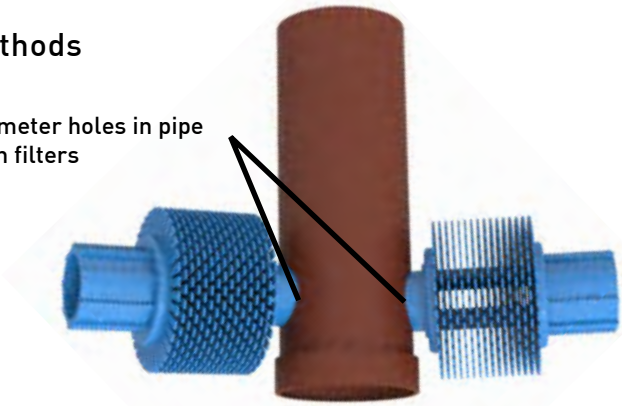
The Seradisc Filter is **very easy to fit** and **very easy to clean**

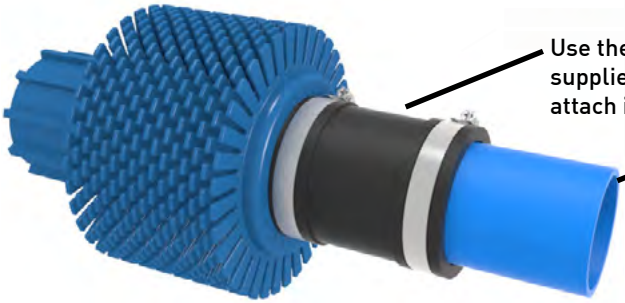
It is made of strong non-metallic material so **will not rust**

It is designed for **modular assembly** and connectible in **multiple configurations**

It has a **cage and float accessory** for floating applications

Installation methods





Watch the video on how to fit a Seradisc Filter
https://vimeo.com/238088405

Adding discs for finer filtration

Your Seradisc Filters come with 16 discs which will screen particulates of 5mm and above. If you need finer filtration you can order extra discs and increase the number of discs on each filter to a maximum of 42 discs - this would screen particulates of 0.1mm and above.

See more about the Seradisc Filter including how to add discs
https://vimeo.com//142393666

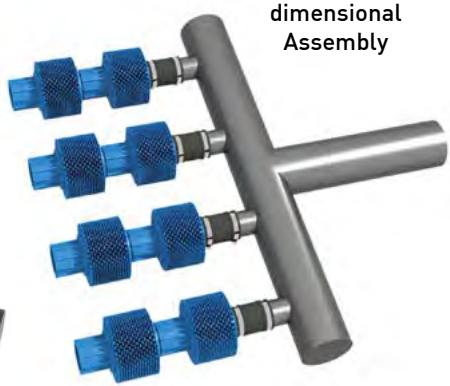
Modular Assembly

For increased capacity or larger diameter pipes. Units may be connected in multiple configurations.

In-line Assembly

In Parallel Assembly

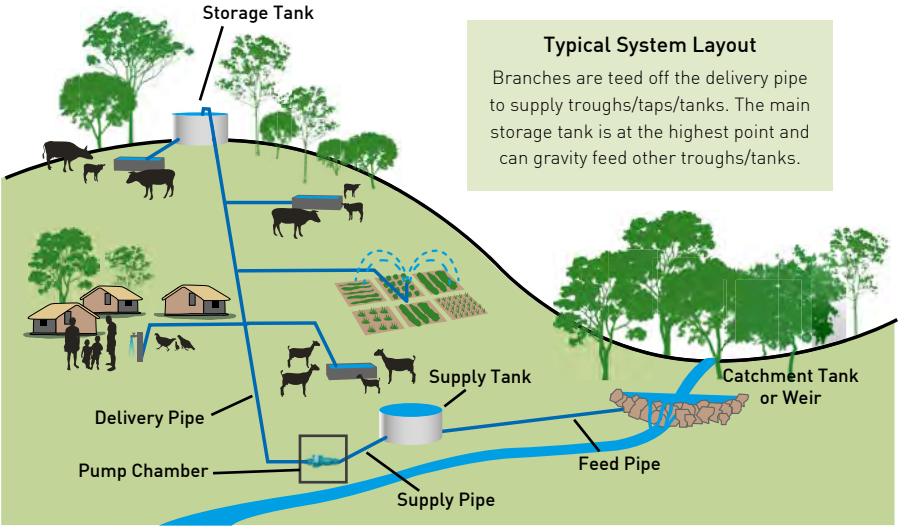
Multi-dimensional Assembly



For more details and technical information please go to:
www.seradisc.com

Installation and Commissioning

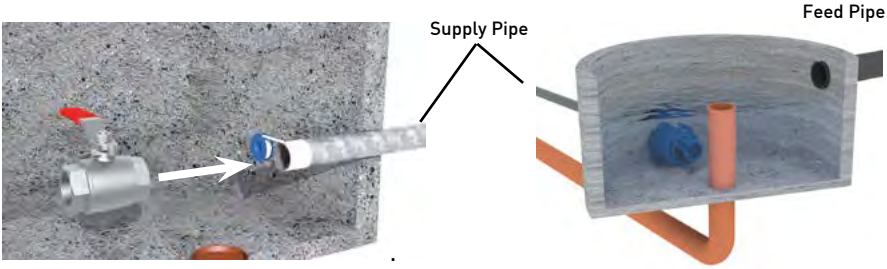
Water troughs can be branched off the main delivery pipe as long as they are fitted with float valves. In these cases the delivery pipe should be plumbed into the bottom of the reservoir/storage tank to allow for back flow when demand is high. The highest off-take requires an overflow either back to the source or ditch.



Flushing the system prior to pump installation

It is **VERY IMPORTANT** to prevent the ingress of harmful stones and debris which will cause serious damage to the pump.

Flushing the supply pipe



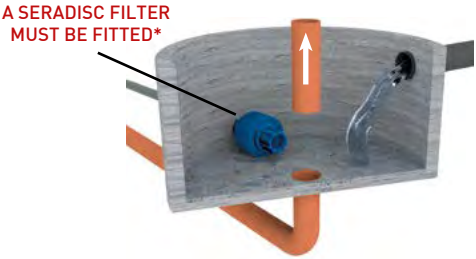
1. Using PTFE tape, fit the Shut Off Valve onto the Supply Pipe in the Pump Chamber.

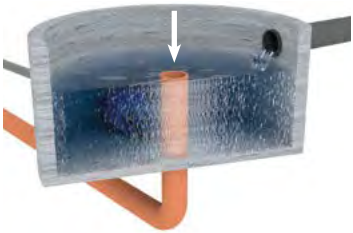
2. Close the Shut Off Valve and allow the Supply Tank to fill with water.

3. When the Supply Tank is full, open the valve and allow the water to run through for about 30 seconds. Then repeat a few times.

4. Close the Shut Off Valve and you are ready to fit the pump.

Flushing the supply tank





1. Remove the overflow/flush standpipe in the Supply Tank to allow any loose material to be flushed away.

2. Refit the standpipe and allow the system to fill.

***Ensure that Seradisc Filters are installed on both the Feed Pipe and the Supply Pipe intakes to prevent the ingress of debris into the system during normal operation.**

Installing the Papa Pump

1. Apply PTFE tape to the 2” BSP Adaptor.

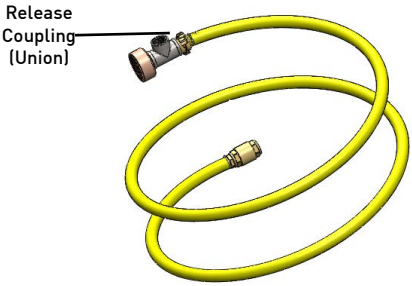
2. Screw the Adaptor into the Shut Off Valve until hand tight.

3. Ensuring the ‘O’ ring is in place in the adaptor, screw the pump body onto the adaptor until hand tight.

4. Make sure the final pump position is with the exhaust facing upwards.

5. Support the underside of the pump with a suitable wooden block to alleviate the weight on the lever valve. **(do not screw down or secure the pump)**

6. Unscrew the release coupling on the hose assembly and attach the assembly to the pump.

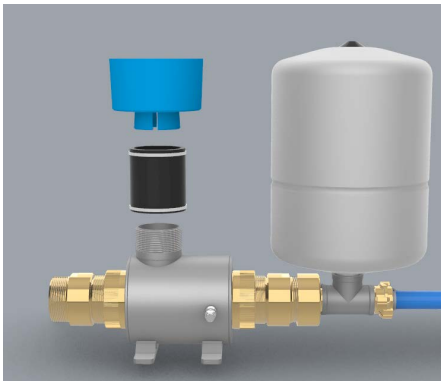


7. Adjust so that the Tee is facing upwards.

8. Refit the Delivery Hose onto the Release Coupling.

9. Using PTFE tape, install the non-return valve onto a suitable pipe connector and fit to the delivery pipe, ensuring that the pipe is not tight or twisted.

10. Secure the adapter and exhaust cup onto the exhaust port.



Priming and Fitting the Pressure Vessel

1. Calculate the pressure for your vessel by taking the delivery head (height from your pump to the highest point in the system, usually storage tank or reservoir) - every 10 metres in height equals 1 bar pressure. From the total take away half a bar pressure to get the final pressure vessel setting. For example:

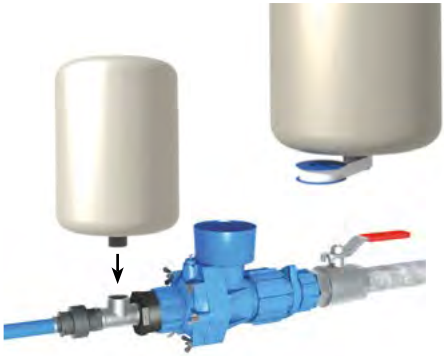
30 metre delivery head = 3 bar - 0.5 bar
Pressure Vessel should be set to 2.5 bar

50 metre delivery head = 5 bar - 0.5 bar
Pressure Vessel should be set to 4.5 bar

80 metre delivery head = 8 bar - 0.5 bar
Pressure Vessel should be set to 7.5 bar

The maximum pressure for the vessel is 10 bar - for delivery heads above 105 metres, please contact Water Powered Technologies.

2. Use an air pump to prime the vessel to the correct pressure.



3. Using PTFE tape, screw the Pressure Vessel onto the Tee .

IMPORTANT: DO NOT REMOVE THE PRESSURE VESSEL WITHOUT DE-PRESSURISING FIRST - Unscrew the vessel for two turns only, releasing some air, and then leave until it has been completely de-pressurised and only then can you continue to remove the Pressure Vessel.

HOW TO START, THEN ADJUST THE PAPA PUMP

(metal version)

To start your pump, the air needs to be expelled from both the supply pipe and the pump. This process is referred to as 'priming' and the time required to achieve this will depend on the pipe length and gradient. *(Systems with long pipe lengths and gradual gradients will take longer to prime).*

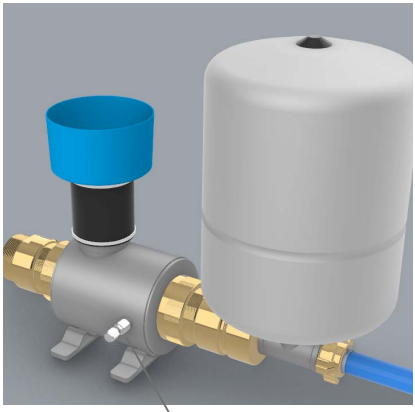
The operational sequence required to prime and adjust the pump is as follows

1 Turn the two Adjusters (4) in the direction (+) to fully open the pump main valve. Apply a slight hand pressure to secure them on their 'O' ring seals. (Turning the Adjusters simply allows the Main Body (1) to move relative to the Barrel (2).)

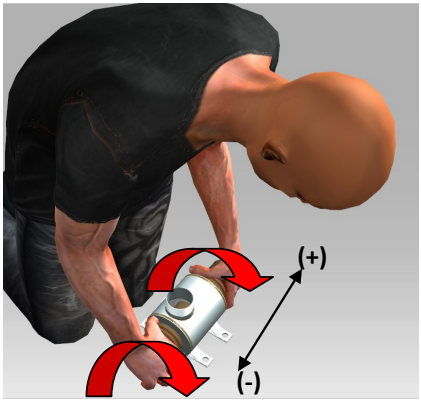
2 Open the shut off valve so that water is allowed to flow through the pump and expel any air (be careful not to allow the supply tank water level to fall thus allowing air to enter the supply pipe when priming). The shut off valve can be closed intermittently to allow this level to be maintained during the priming process.

3 With most of the visible air removed, turn the Knurled Adjusters (4) in the opposite (-) direction until the pump 'beats'. If the pump beats and no fur-ther water flows, close the supply ball valve and release the pressure by the pressure valve on the side of the pump. Repeat this process until the pump operates continuously.

4 Adjust the pump setting with the Adjusters (4) until a small overflow is permitted from the supply tank.



Pressure release valve



Adjusting the Pump

Adjust the pump setting with the adjuster so that a small overflow is permitted from the supply tank. Lock the adjuster with the lock nut.

Listen to the beat...

A regular beat means that the pump is working properly.

An irregular beat means that there is air in the supply pipe. You must repeat the process of starting the pump again.

The longer the beat, the more water you are pumping.

Self Priming. The Papa Pump will often 'self prime' - which means it will automatically start as soon as you as you open up the Shut Off Valve.

Please also refer to the previous section on page 22 ('Starting the Pump') for new installations.

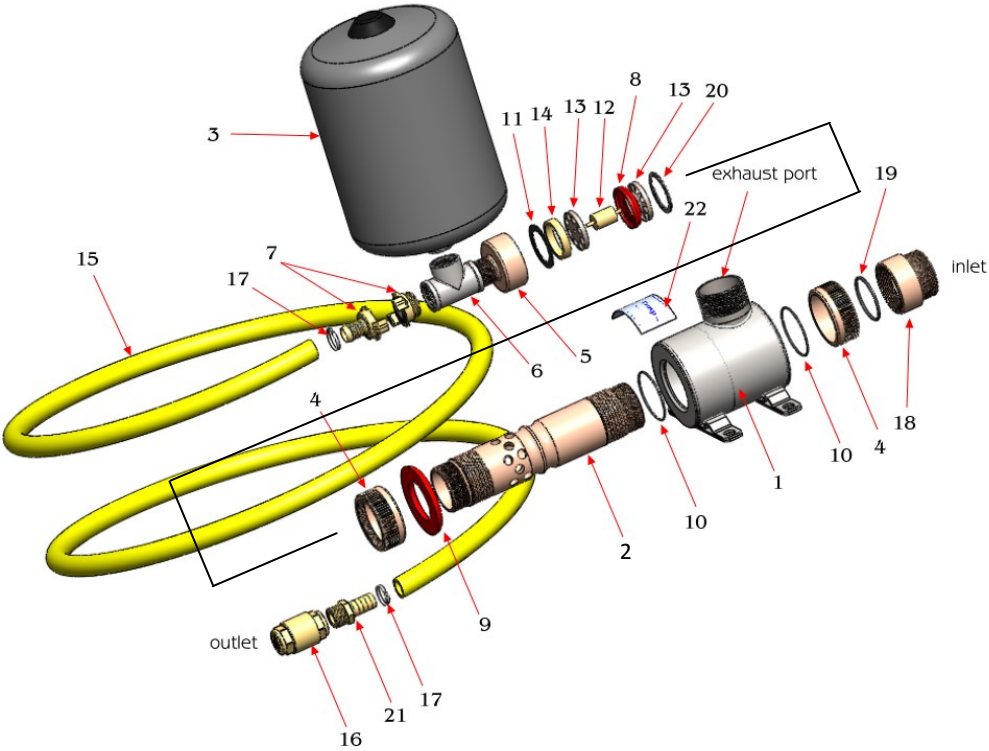
Please note: After the pump has run for a while, it may need a final adjustment.

Checking your delivery. Check the delivery of the pump at the highest point using a measuring jug. Remember that, depending on the delivery pipe length, it can take a long while for the system to fill. You can also check the performance of the pump by fitting a pressure gauge on the delivery pipe.

Health and Safety

Before commencing work, refer to current safety publications relative to your location.

Metal pump parts list



1 Main Body
2 Barrel
3 Accumulator (supplied to order)
4 Knurled Adjuster
5 Reducer
6 Tee
7 Q/R hose connector
8 NRV valve member
9 Main Valve member
10 Adjuster ‘O’ ring
11 Adaptor Seal
12 Valve Spigot
13 Valve Seat
14 Valve Spacer
15 Hose
16 NRV (metal)
17 Hose Clip
18 Adaptor
19 Adaptor ‘O’ ring
20 Retainer
21 Hose Tail
22 Label

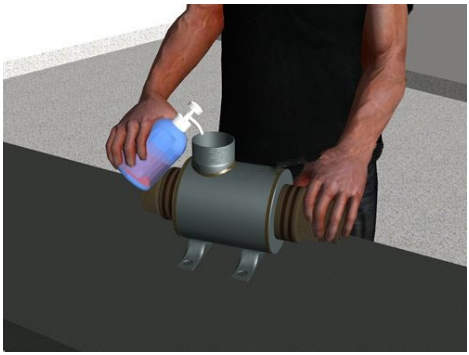
Metal pump maintenance

Maintenance is simple and involves a periodic check to ensure all waterways are clear and that the pump is still operating correctly. The Main Valve member (9) and the NRV Valve member (8) are the only moving parts and should last for many years of normal use. The pressure vessel will require inspection for leaks and damage and will also require a periodic air charge to maintain air pressure.

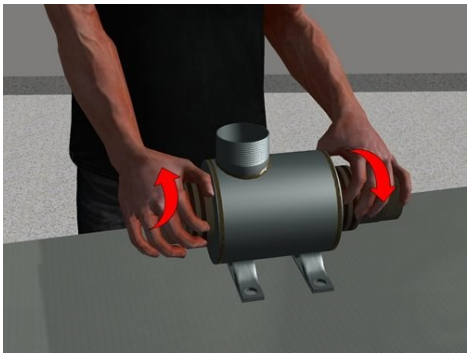
How to change the pump valves

Changing the Main Valve member (9) is a straightforward procedure and can easily be carried out in the field if required. Firstly, shut off the water supply to the pump by turning the handle on the shut off valve (see page 15) You can now slowly unscrew the pressure vessel to release pressure. **DO NOT UNSCREW THE VESSEL FULLY UNTIL THE WATER PRESSURE IS RELEASED.** Remove the coupling (7) and release and remove the Adaptor assembly (5,6,7).
Unscrew the pump assembly anti-clockwise to release the Barrel (2) from the supply Adaptor (18). Release both Knurled Adjusters (4) and continue to unscrew the

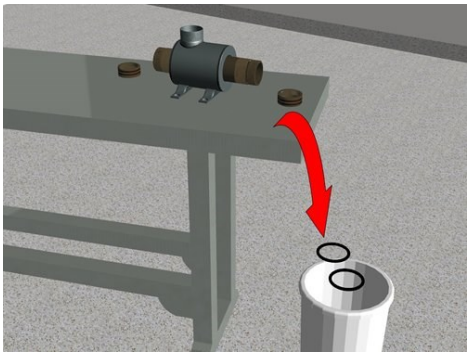
Apply a soap-like lubricant down the Exhaust Port and if necessary clean any exposed threads around the knurled adjusters



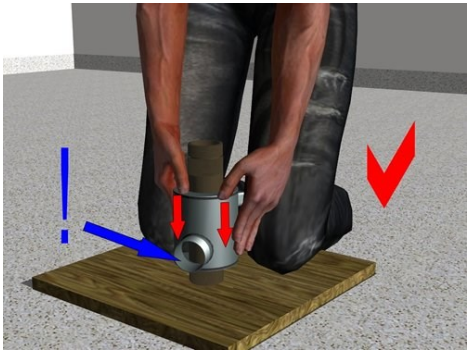
Unscrew both Knurled Adjusters (4).

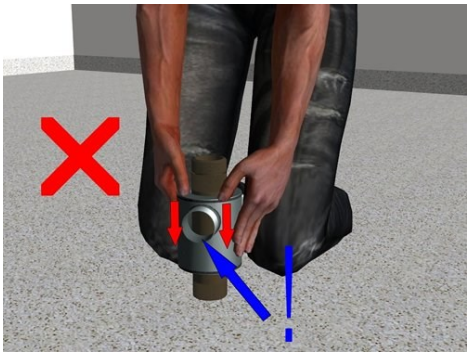


Discard the old ‘O’ rings (10)

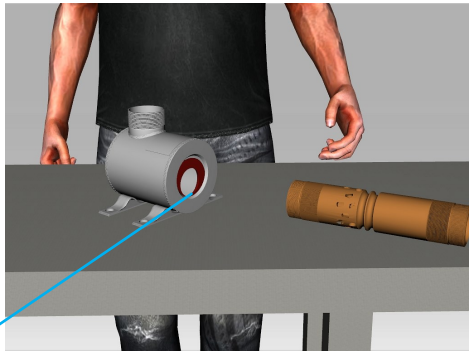


Holding the delivery end of the Barrel (2), pull it from the Main Body (1) in the direction of output, taking care not to damage the threads



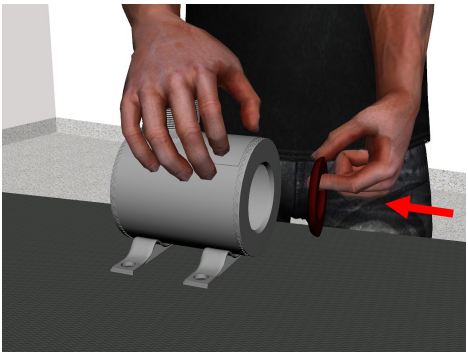


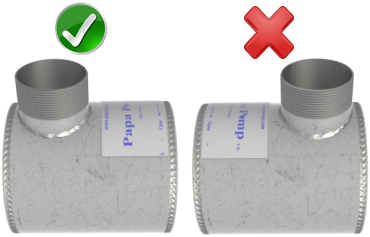
The Main Valve member (9) will be left inside the Main Body (1). Extract it and dispose, then clean all the parts ready for re-assembly

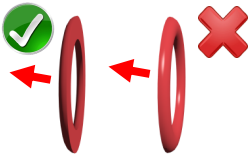


Take the new Main Valve member (9) and **lubricate with a soap-like substance.**

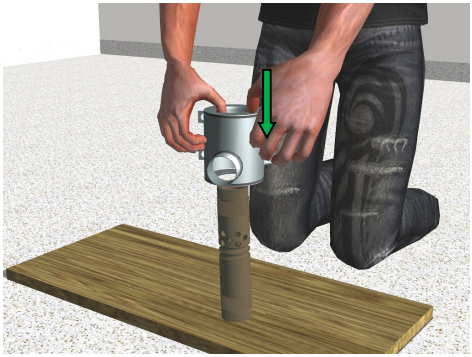
Insert Main Valve member (9) into the Main Body (1) from the output end.

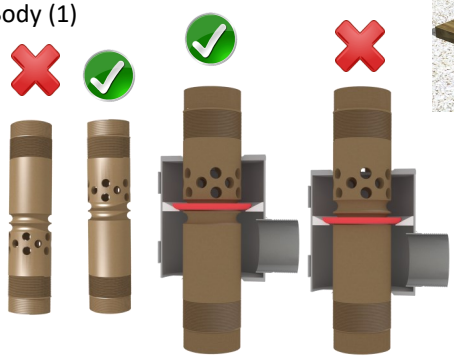




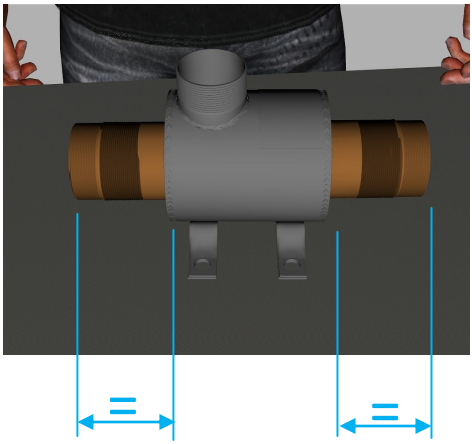


Re-insert the Barrel (2) into the Main Body (1)

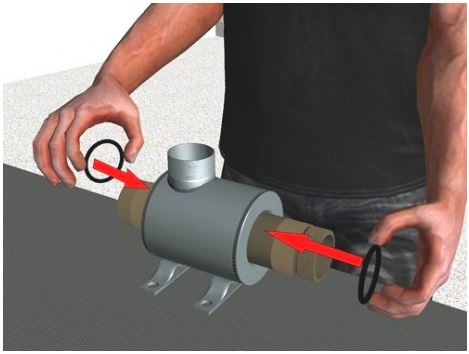




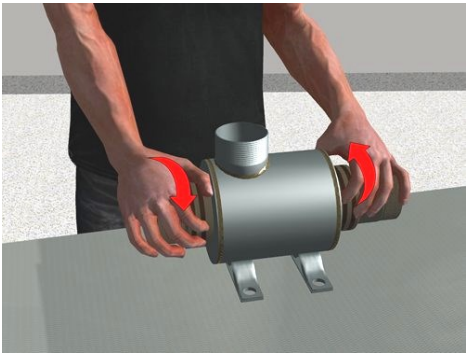
Push the Barrel (2) through until you feel resistance as the Main Valve member (9) finds its seating, then pull it back until you feel firm resistance. The Barrel (2) will now be approximately central in the Main Body (1)



Fit new ‘O’ rings (10)

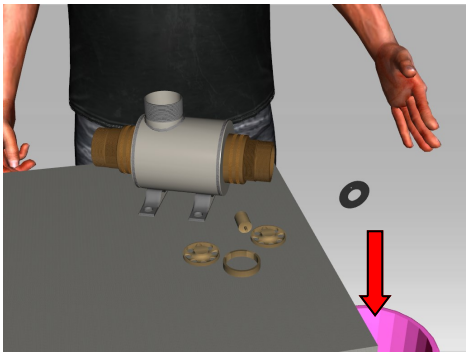


Re-fit the Knurled Adjusters (4) at each end to hand-tight.

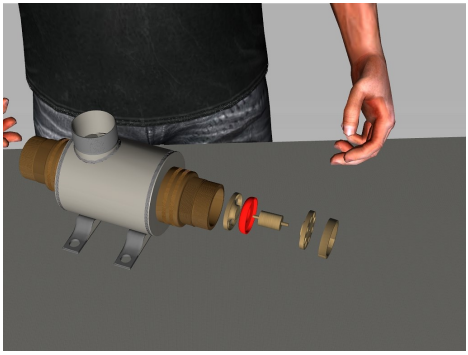


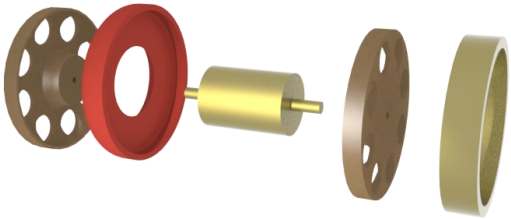
Remove the Valve Spacer (14), the 2 Valve Seats (13), the Valve Spigot (12) nd the NRV Valve member (8) from the end of the Barrel (2) using a screwdriver.

Discard the old NRV Valve member (8)



Refit one Valve Seat (13) followed by the new NRV Valve member (8), the Valve Spigot (12), the second Valve Seat (13) and finally the Valve Spacer (14)

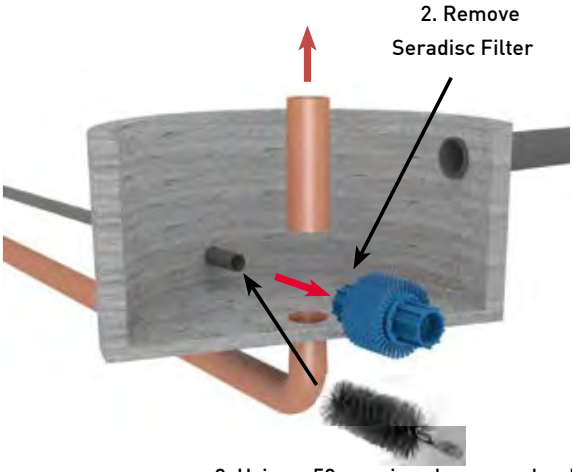




Cleaning the Supply Pipe

Some water sources contain minerals such as Iron or Manganese which could, in time, build up on the inside of the Supply Pipe, restricting the flow and reducing the efficiency of the pump. If there is evidence of these mineral deposits (such an orange-red coating) you can clean the Supply Pipe by first stopping the pump, then removing the Filter in the Supply Tank and pushing a pipe cleaner down the Supply Pipe. **THERE IS NO NEED TO TAKE THE PUMP OFF AND CLEAN IT**. It is often assumed that these deposits will affect the pump but this is incorrect - **YOU ONLY NEED TO CLEAN THE SUPPLY PIPE**.

1. Remove Standpipe to drain Supply Tank



3. Using a 50mm pipe cleaner and rods, clean the Supply Pipe

4. Re-attach the Seradisc Filter and the Standpipe and fill the Supply Tank before restarting the Pump.

Troubleshooting

Identifying the most likely causes, relating to system faults.

Legend: water · pipes · air · blockage · technical

Single Beat

Fault		Pump beats once, then stops.
Common Causes		Low delivery pressure.
ACTION	Refer to 'Priming' on page 21	

Pump beats but then stops

Fault		Pump beats, but then stops after a period of time.	
Common Causes	 Air in Supply Pipe	 Supply Tank level too low	 Blocked Filter or Pipes
ACTION	Refer to 'Priming' on page 21	Make sure Supply Tank is kept full. Re-prime pump.	Clean filters and pipes. Re-prime pump if necessary.

Irregular pump beat

Fault	Irregular pump beat	
Common Causes	Air in Supply Pipe	SUPPLY PIPE IS NOT THE REQUIRED 5-7 TIMES THE SUPPLY HEAD
ACTION	Refer to 'Priming' on page 21	Refer to 'Supply Pipe' on page 14.

Excessive Pump Vibration

Fault	Pump shakes excessively during operation			
Common Causes	Incorrect Pressure in the Pressure Vessel	Water escapes from valve when depressed	Supply Pipe not straight	No Pump Support
ACTION	Use an air pump to correct the pressure	Replace the Pressure Vessel	Relay pipe straight	Support Pump with block of wood or concrete

Low flow rate

Fault	 Pump beat is normal but delivery flow less than it should be.			
Common Causes	 Check for blockages, or wear on the non return valves	 Air or blockage in Pump or Supply Pipe	INSUFFICIENT SUPPLY HEAD or INCORRECT SUPPLY PIPE SPECIFICATION	 Blocked Filter or Supply Pipe
ACTION	Clear any blockages and replace any damaged valves. See page 25	Refer to 'Priming' on page 21	Refer to 'Supply Pipe' information on page 14	Clean filters and pipes. Re-prime pump if necessary

notes

Pressure Relief Valve leaking

Fault	 Water leaks from Pressure Relief Valve			
Common Causes	 Pressure Vessel incorrect pressure	 Water escapes from valve when depressed	 Pressure Relief Valve damaged	DELIVERY HEAD is above 100m
ACTION	 Correct pressure in Vessel	 Replace the Pressure Vessel	Replace Pressure Relief Valve	Check with Water Powered Technologies for solution

notes

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