

# Papa Pump®



**the pump that uses no fuel!**

# INSTALLATION MANUAL

January 2018



[www.waterpoweredtechnologies.com](http://www.waterpoweredtechnologies.com)

# Glossary of Terms

<b>Flow</b>	Measurement of water flow (cubic metres per second)
<b>Catchment</b>	Water taken from the natural watercourse to supply water held in a catchment tank or a weir
<b>Catchment Tank</b>	A vessel to hold the water diverted from the natural watercourse. In the U.K. this is usually made from concrete rings but could be any tank able to hold up 1m <sup>3</sup> litres of water
<b>Weir</b>	A dam or barrier on the natural flowing watercourse to create a stable pressure to feed water to the supply tank
<b>Feed Pipe</b>	The pipe carrying the water from the catchment to the supply tank
<b>Feed Length</b>	Measurement of the <b>distance</b> from the catchment to the supply tank
<b>Supply Head</b>	Measurement of the <b>drop</b> from the supply tank to the pump The greater the supply head → the greater the pressure of water going into the pump → the more efficient the pump
<b>Supply Pipe</b>	The pipe from the Supply Tank to the Pump, sometimes called the Drive Pipe
<b>Supply Length</b>	Measurement of the <b>distance</b> from the supply tank to the pump chamber
<b>Delivery Head</b>	Measurement of the <b>height</b> from the pump to its destination, e.g. a storage tank at a higher elevation
<b>Delivery Distance</b>	Measurement of the <b>distance</b> from the pump to its destination, e.g. a storage tank at a higher elevation
<b>Pump Barrel</b>	The main body of the pump
<b>Supply Port</b>	Where the supply water enters the pump
<b>Exhaust Port</b>	Where the depressurised water is expelled from the pump
<b>Delivery Port</b>	Where the pressurised water leaves the pump for delivery
<b>Venturi Valve</b>	The flexible rubber valve between the supply port and the exhaust port
<b>Internal Non Return Valve</b>	The flexible rubber valve in the delivery port
<b>External Non Return Valve</b>	The valve on the delivery side of the Pressure Vessel
<b>Pressure Relief Valve</b>	A safety valve on top of the pump
<b>Pressure Vessel</b>	Using a pressure vessel will reduce pulsing of the delivered water
<b>Shut Off Valve</b>	Sometimes called a 'Ball Valve', the valve to turn on/off the water supply to the supply port
<b>BSP Adaptor</b>	An adaptor fitted to the Supply Port
<b>Exhaust Extension</b>	The cup placed on top of the exhaust port

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# Technical Installation Guide for the Papa Pump

## Installation Principles

A Natural Water Source is Required.



river



stream



spring



pond/lake

The Papa Pump requires a flow and head of water to operate, **the higher the supply head, the more efficient the pump** therefore it is important that you find the maximum head available to pump the maximum amount of water.

The minimum flow for the pump to operate efficiently is 50 litres/minute. Flows lower than this or irregular flows may need a SureFlow Valve to regulate.

PLEASE NOTE THE PUMP IS NOT DESIGNED  
TO BE SUBMERGED IN WATER  
(This will not harm the pump but it will not work properly)

The water feed to the pump must be piped from a weir or a catchment tank at a higher level.

# Water Delivery Principles

## The Supply Head

**The Greater the Supply Head,  
the More Efficient the Pump**

## The Pump

**The pump will operate without manual intervention  
when at least 50 litres of water per minute  
is supplied to the pump through its supply port**

**A minimum of 70% of the water is depressurised and  
ejected out of the exhaust port and returned to the  
watercourse via the overflow pipe**

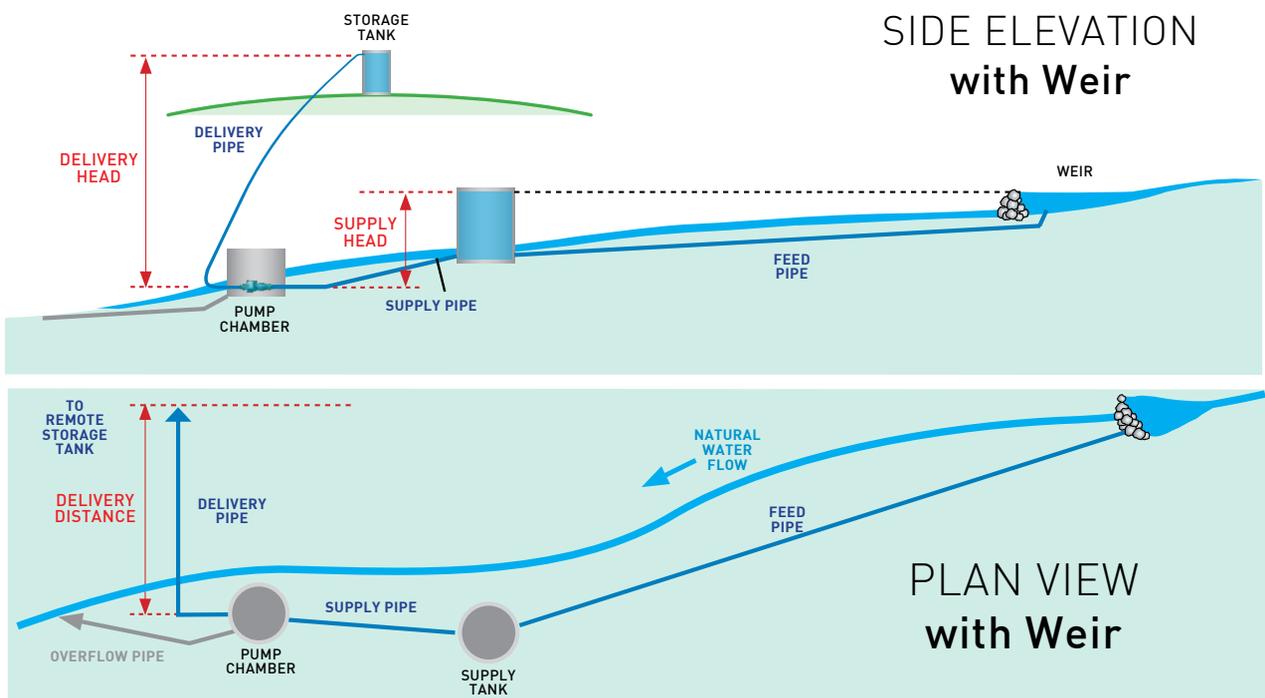
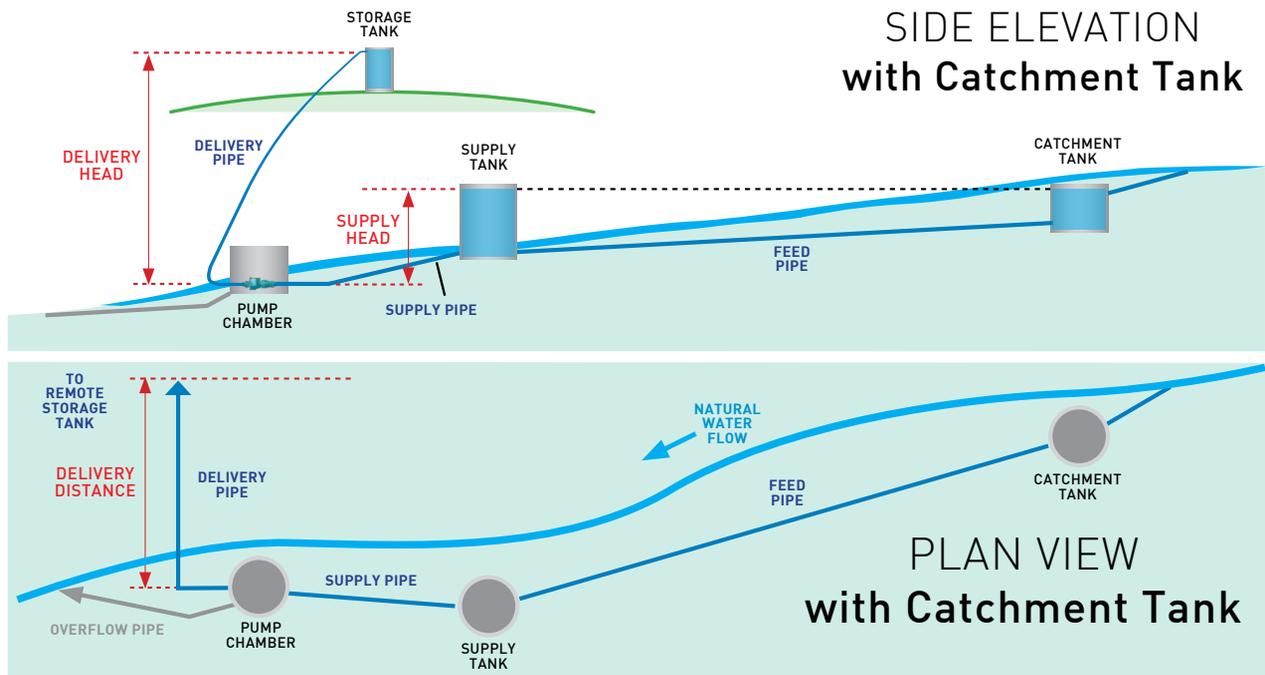
**A maximum of 30% of the water is pressurised and  
delivered to high elevations or long distances**

## Water Delivery

**The distance and the height to which the water can be  
delivered, depends on a combination of the supply head  
height and the amount of flow into the pump (*see page 8*)**

# Correct Site Installation

**The Greater the Supply Head, the More Efficient the Pump.**



# 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 50 litres per minute minimum to operate a Papa Pump.

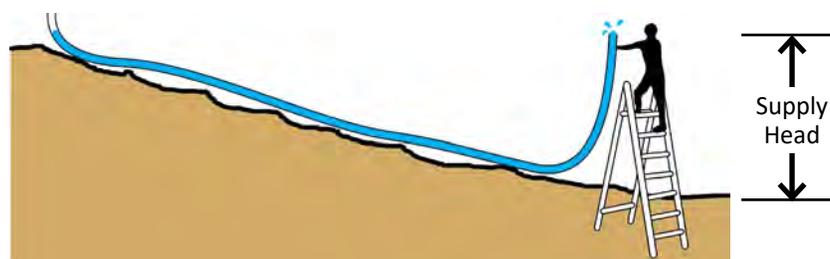


# Measuring the Supply Head

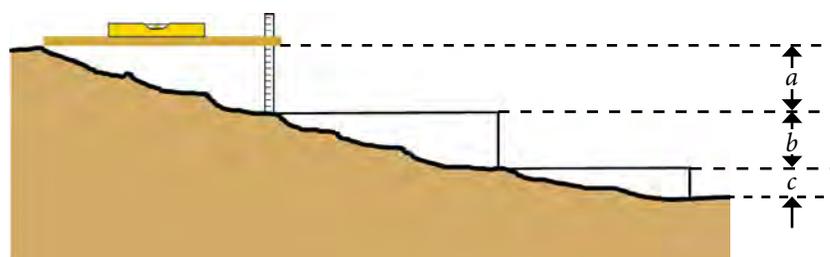
**The minimum supply head required for the Papa Pump to operate is 1 metre.**

If you don't have a theodolite to hand, you can measure the supply head by the following simple methods:

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.  $a+b+c = \text{Supply Head}$ .



# 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/day)

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



Figures shown are amount of water delivered in litres/day

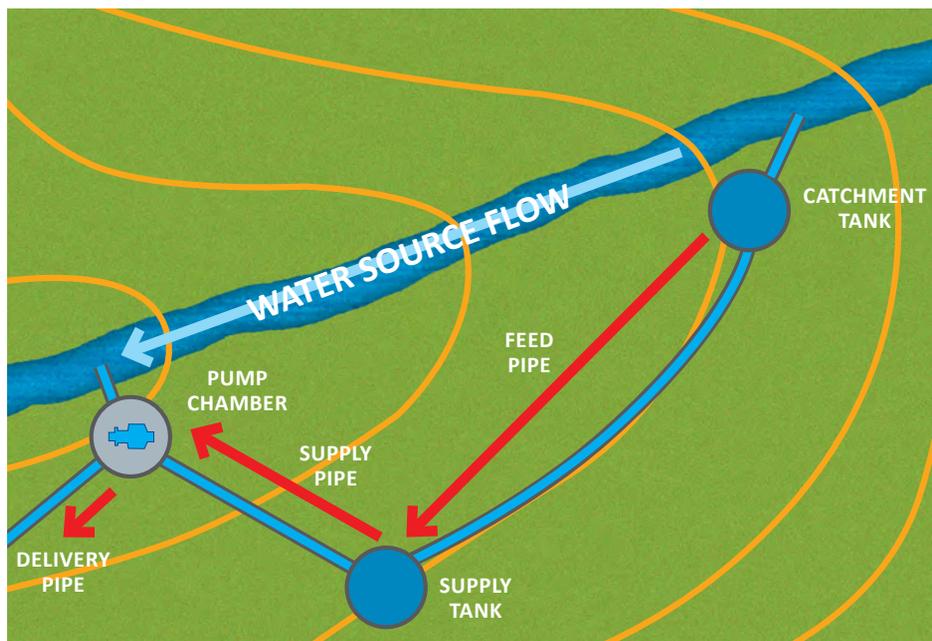
Supply Head (Fall)	feet	metres															
			6	7.5	9	12	15	23	31	46	62	77	92	123	metres		
			20	25	30	40	50	75	100	150	200	250	300	400	feet		
100	31									25920	20736	17280	15120				
75	23								25920	19008	17280	15120	11232				
50	15							25920	17280	15120	12096	10368	7776				
40	12							20736	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	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 Powered Technologies or your distributor

## Using the contours of the land

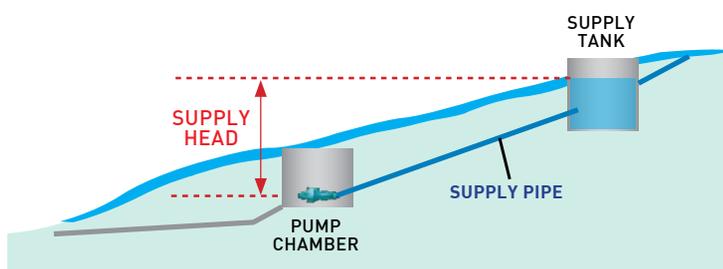
The route of the feed pipe doesn't have to follow the stream or river.

You can place the Supply Tank on the same contour as the catchment point to create a greater supply head with a shorter Supply (Drive) Pipe so that the Pump will deliver more water.



## When a Catchment Tank is not required

**Springs or Streams with a high Supply Head do not require a Catchment Tank**



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.

# The Catchment Tank

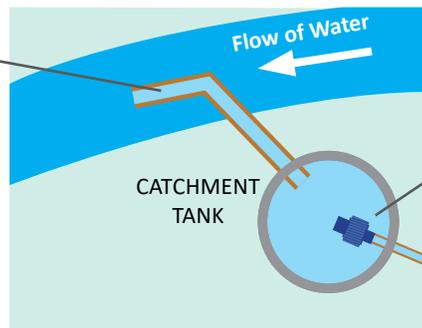
**All Papa Pump Systems require a catchment tank or a weir unless the watercourse has a steep gradient.**

**A filter should be fitted to the Feed Pipe to prevent particulates affecting the efficiency of the Pump.  
2 Seradisc Filters are included with every Papa Pump Kit**

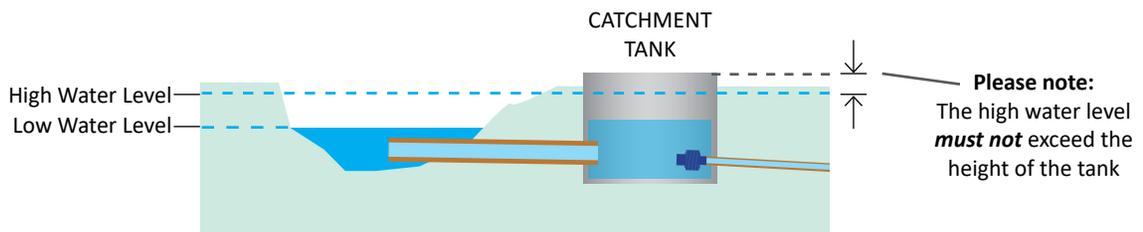
The Catchment Tank (or Weir) acts as the first stage of filtration from large debris and allows the settlement of sediment.

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).

**Please note:** The pipe inlet *must* face downstream



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



Seradisc Filters are 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.

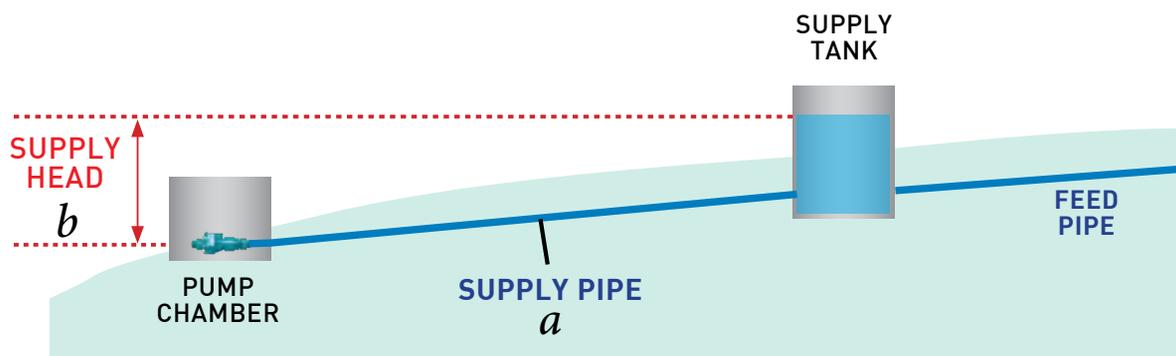
Recommended Pipe for Inlet Pipe and Feed Pipe:  
**110mm Soil Pipe** (up to 2 pumps) or **150mm Soil Pipe** (3+ pumps)

# The Supply Tank

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

**A Minimum Supply Head of 1 metre is required but 2 metres is recommended for efficient pumping**

Streams or rivers with small gradients may require the water to be transported a long distance to the pump to gain a sufficient Supply Head. 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)



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

**2 inch**  (internal diameter) **Steel Pipe** is the ideal material for the Supply Pipe but to reduce costs **63mm MDPE** (Medium Density Polyethylene) can be used on long supply pipe lengths

Rules for the use of Steel/MDPE pipe depend on the height of delivery:

**If the Delivery Head is less than 15 metres**, the Supply Pipe can be entirely 63mm MDPE

**If the Delivery Head is greater than 15 metres**, the Supply Pipe must be at least one third Steel Pipe with the rest being MDPE (with steel portion being at the Pump Chamber end)

We **do not** recommend the use of flexible hose for the Supply Pipe.

**IT IS IMPORTANT THAT ALL PIPE IS KEPT AS STRAIGHT AS POSSIBLE**  
(Bends in the pipe will produce friction and reduce the efficiency of the Pump)

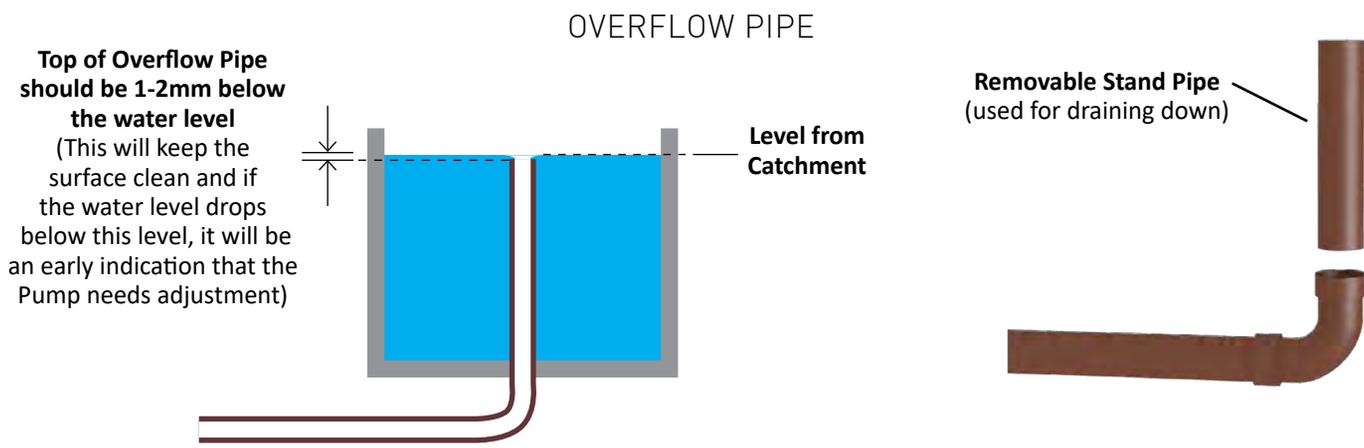
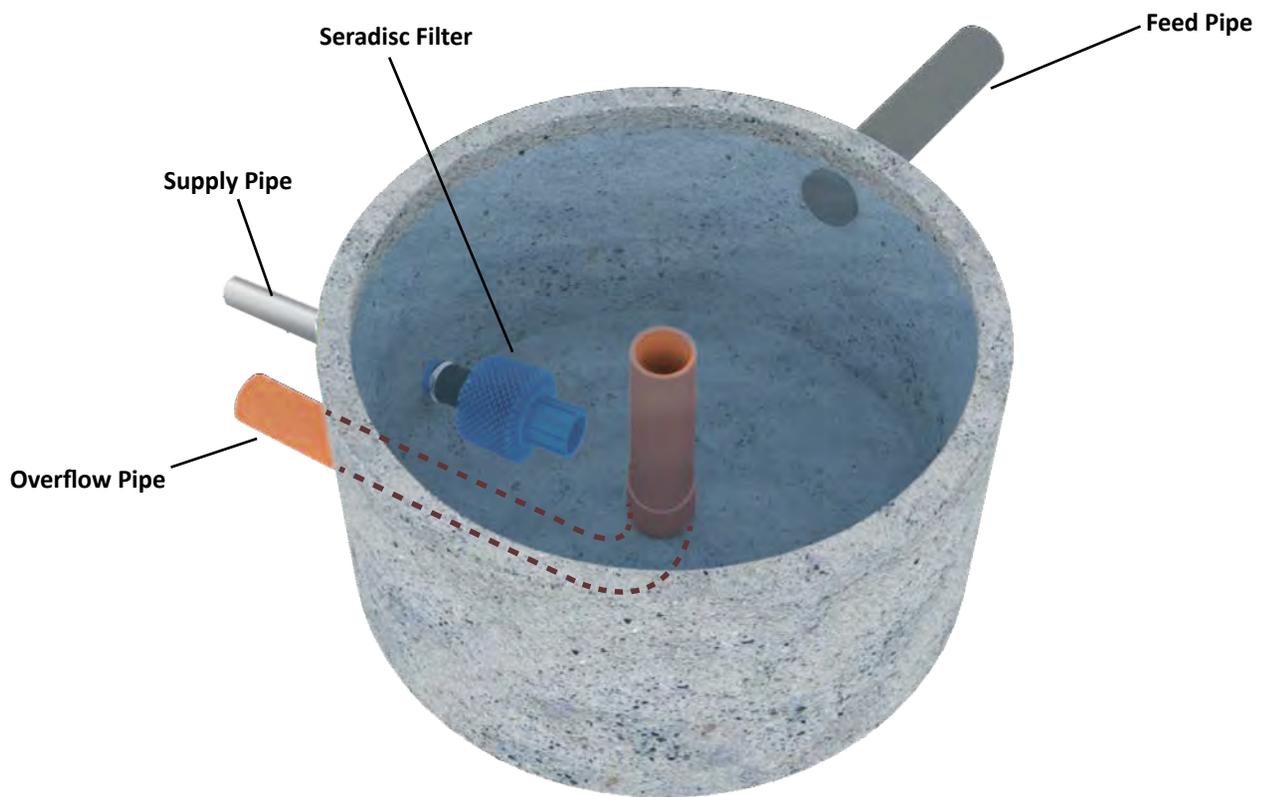
# The ideal Supply Tank installation

Installing the Supply Tank correctly is important if you want the Papa Pump system to work to maximum efficiency.

The minimum size of tank should be 1m depth and 1m internal diameter.

The Feed Pipe can come into the side of the tank or from underneath.

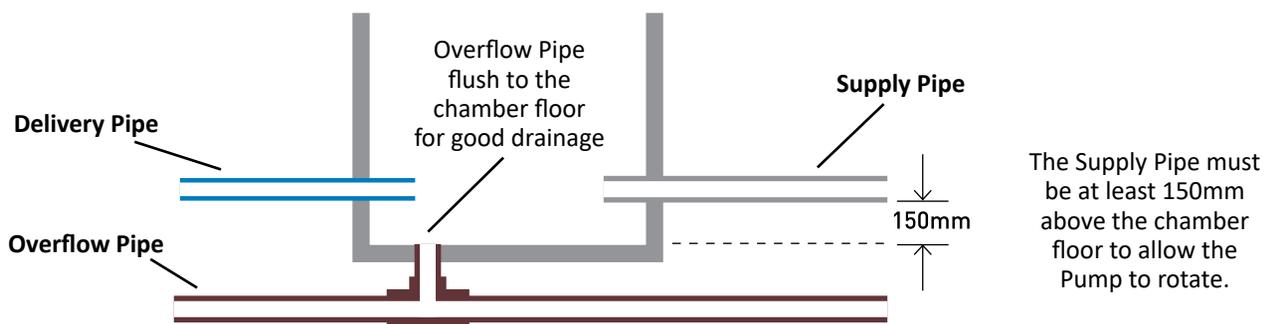
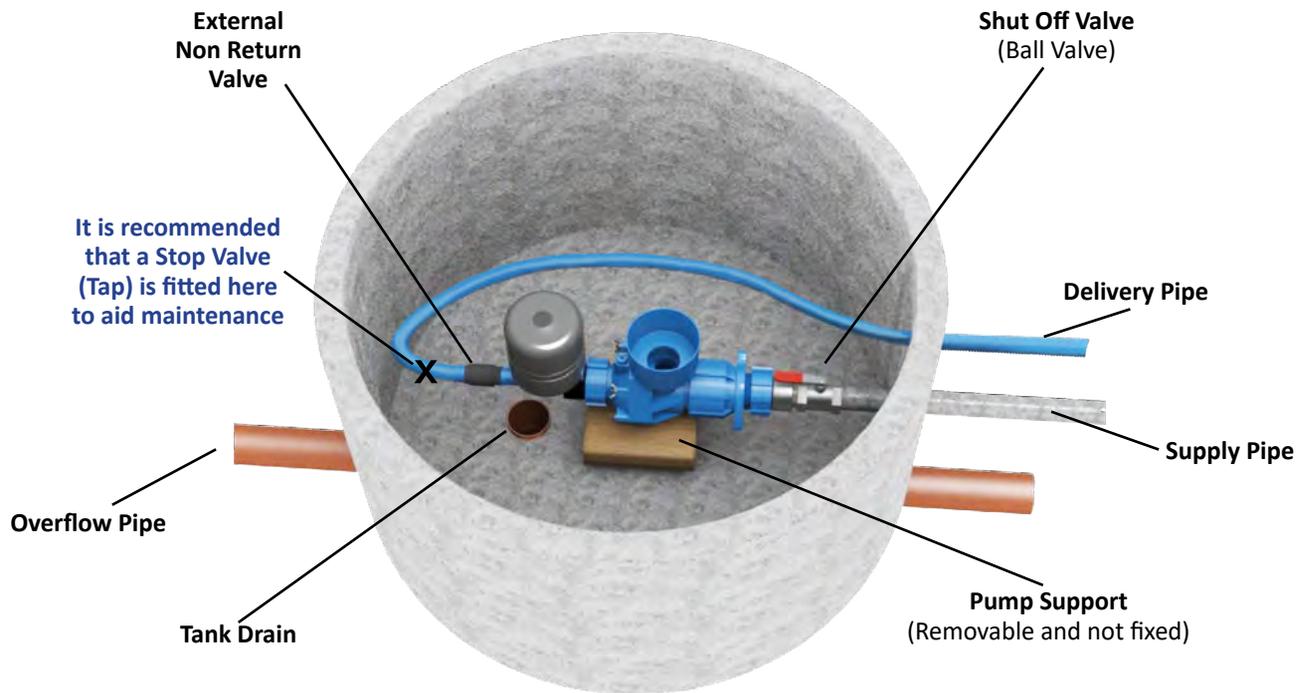
Cover your tank to keep free of debris.



# The ideal Pump Chamber installation

A 1m depth and 1m internal diameter tank can house up to 2 Papa Pumps.  
If 3 or more Pumps are required you will need a larger tank.

Cover your tank to keep free of debris.



## Delivery Pipework, Tanks and Troughs

A stop valve should be installed at the Pump end of the Delivery Pipe to allow for maintenance and replacement of non-return valves, etc., without having to drain the whole delivery pipework.

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 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.

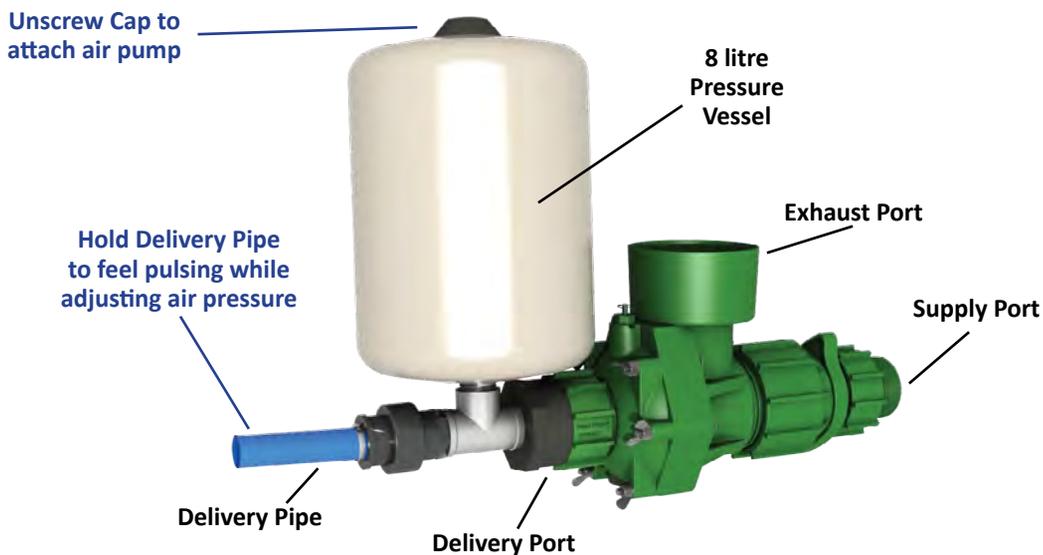
# Using a Pressure Vessel

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.

**It is important to set the air pressure in the pressure vessel to 0.5 bar below the delivery head pressure BEFORE attaching the pressure vessel to the system**

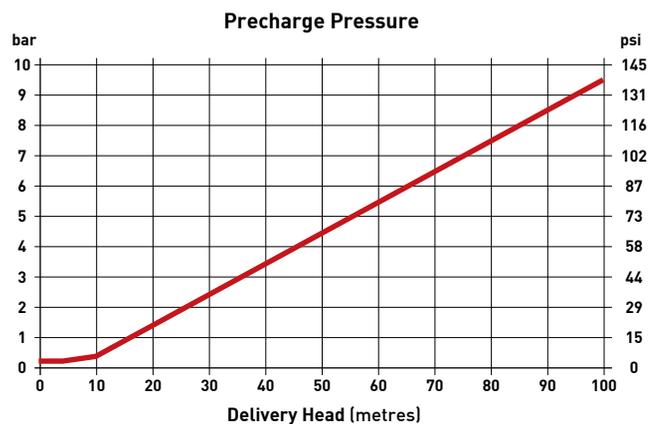
You can use any motor tyre air pump attached to the top of the Pressure Vessel to adjust the pressure.

Once attached to the system, hold the delivery pipe and adjust the air pressure until the pulsing in the pipe is at it's minimum.

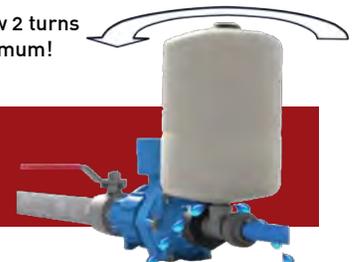


## Pre-charging the Pressure Vessel

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



Unscrew 2 turns maximum!



**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.

# Installation Procedure

## 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 Procedure:

1. Using PTFE tape (thread tape), fit the 2 inch Shut Off Valve supplied with the Pump onto the Supply Pipe in the Pump Chamber
2. Close the Valve and allow the system to fill with water
3. When the system is full, open the Valve and allow water to exit for a while to ensure all debris is washed from within the pipework, then close the Valve
4. Remove the overflow/flush standpipe in the Supply Tank to allow any loose material to be flushed away, then refit the standpipe and allow the system to refill

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

### Installing the Papa Pump:

1. Using PTFE tape (thread tape), fit the BSP Adaptor into the 2 inch Shut Off Valve
2. Screw the Papa Pump into the Adaptor until hand tight and adjust the Adaptor so that the Pump is in the correct position, i.e., with the exhaust facing upwards
3. **Support the underside of the Pump with a suitable wooden block to alleviate the weight on the Shut Off Valve**
4. Unscrew the release coupling on the hose assembly and attach the assembly to the Pump ensuring that the rubber valves in the Pump are present and correctly installed and that the securing tape has been removed. Check that the tee connector is vertical and refit the release coupling
5. Using PTFE tape, install the Non-Return Valve on to a suitable pipe connector and fit to the Delivery Pipe ensuring that the pipe is not tight or twisted
6. Adjust the air pressure in the Pressure Vessel to 0.5 bar below the Delivery Head pressure, (e.g. with a delivery head of 50m, the air pressure will be set to 4.5 bar. Using PTFE tape, install the Pressure Vessel into the delivery tee
7. Install the Exhaust Extension into the Exhaust Port of the Pump.

## Installation Procedure (*continued*)

### **Starting the Pump:**

To start your pump, any air present 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. A short pipe and steep gradient will allow the system to be primed quicker than systems with have long pipes and gradual gradients.

### **The operational sequence required to prime and adjust the Pump is as follows:**

1. Turn the adjuster in the direction indicated on the body of the Pump (+) to open the Pump main valve fully. The 'C' Spanner can be used to assist if required
2. Open the Shut Off Valve so that the 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 process)
3. With most of the visible air removed, turn the adjuster in the opposite direction (-) until the Pump 'beats'. If the Pump stops and no further water flows, close the Shut Off Valve, lift up the Pressure Relief Valve (located next to the Pump Exhaust Port) and release. Re-open the Shut Off Valve. Repeat this process until the Pump operates continuously
4. 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.

*If the Pump operates with an irregular beat, this means that air is still present in the Supply Pipe. The Pump will often 'self prime' when operating, provided the air is first removed and the Pump does not stop.*

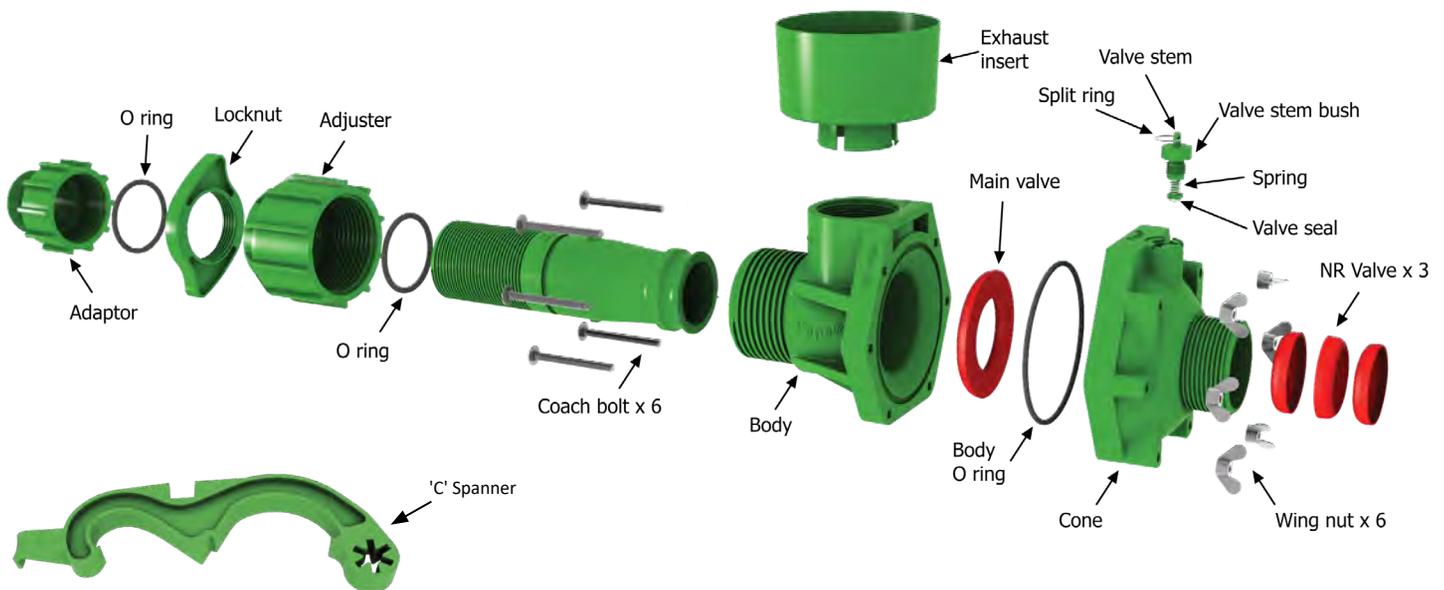
5. Check the delivery of the pump at the highest point using a measuring jug. Remember that, depending on the Delivery Pipe length, it can take a long while for the system to fill. You can also check the performance of the Pump by fitting a pressure gauge.

**Note: The slower the pulse, the greater the flow through the Pump and the amount pumped.**

# Maintenance

The only parts that should need replacing are the rubber valves. The diagram below shows how the Pump is assembled. A special 'C' spanner is included within the kit for loosening/tightening the wing nuts.

**The wing nuts should be tightened to 'finger tight' and then a further 90° with the spanner. For best results tighten the nuts in diagonally opposite order (similar to a car tyre)**



## Regular Maintenance:

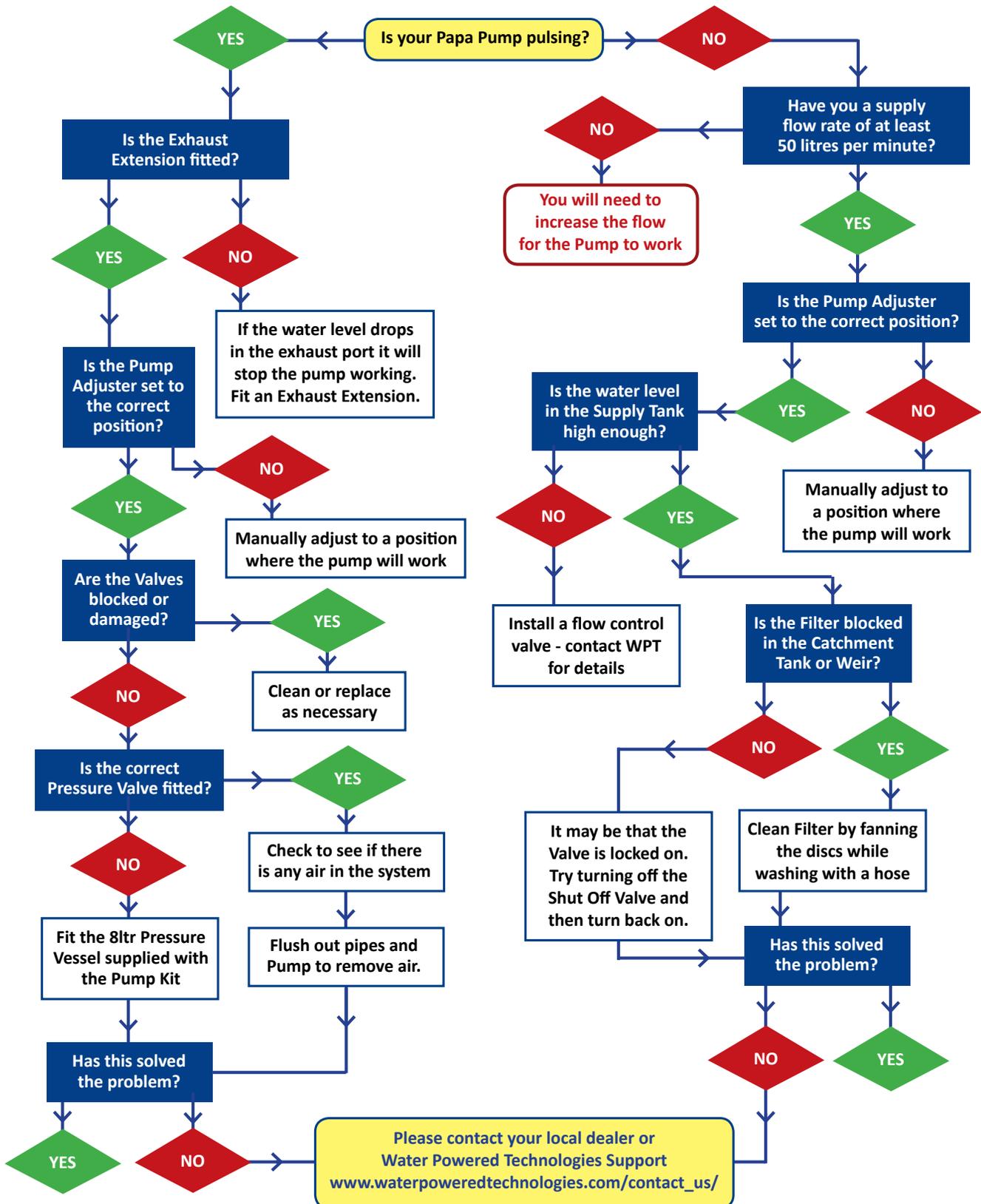
- Regularly check and clean all inlets and Seradisc Filters
- If delivery rates drop, check both the Non-Return Valve and the Main Valve
- Regularly check the air pressure in the Pressure Vessel

**IMPORTANT:** Please use correct procedure to remove Pressure Vessel - see page 14

Please adhere to all Health & Safety Procedures - check with government advice before starting

# Trouble Shooting

The Papa Pump System is designed to give you years of trouble free pumping. However, should you have a problem, here is a quick check list to see if there is an easy solution to the problem.





# Papa Pump®



A Great  
UK Design

PATENTED

**the pump that uses no fuel!**



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