



Water Powered
Technologies



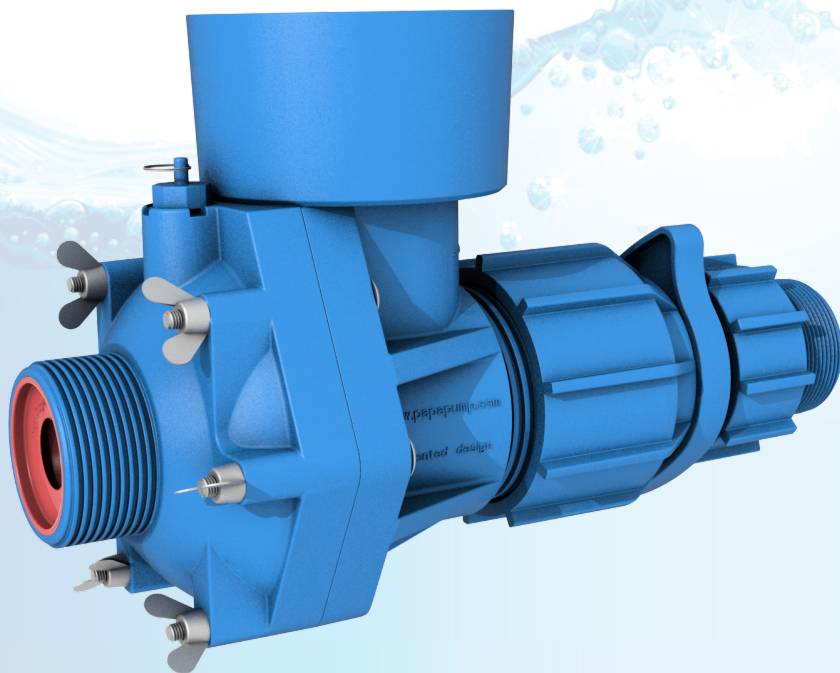
a great UK
design

Papa Pump[®]

Water Powered Technology

Owner's Manual

Installation, Operation and Maintenance Guide

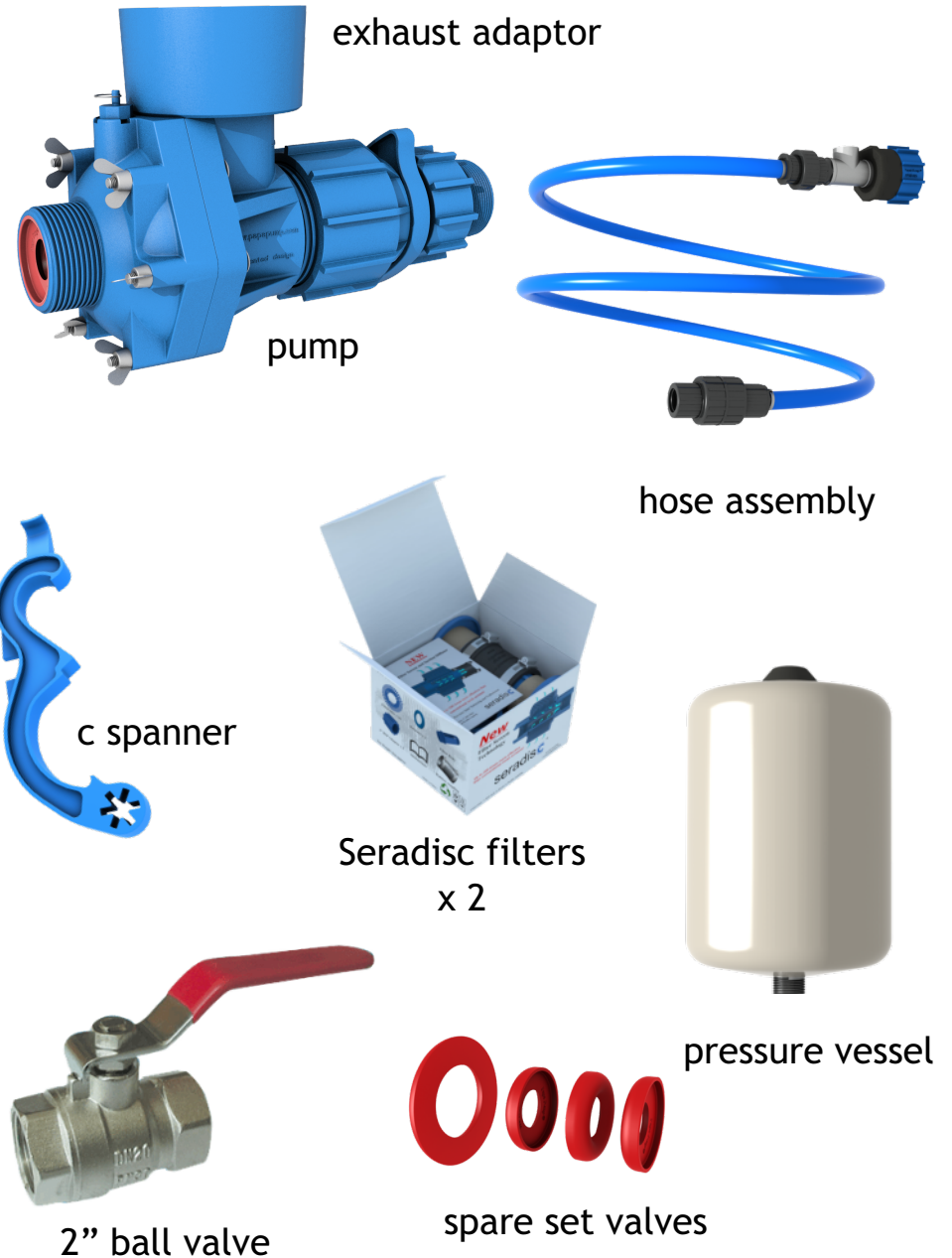


patented design

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Kit Contents



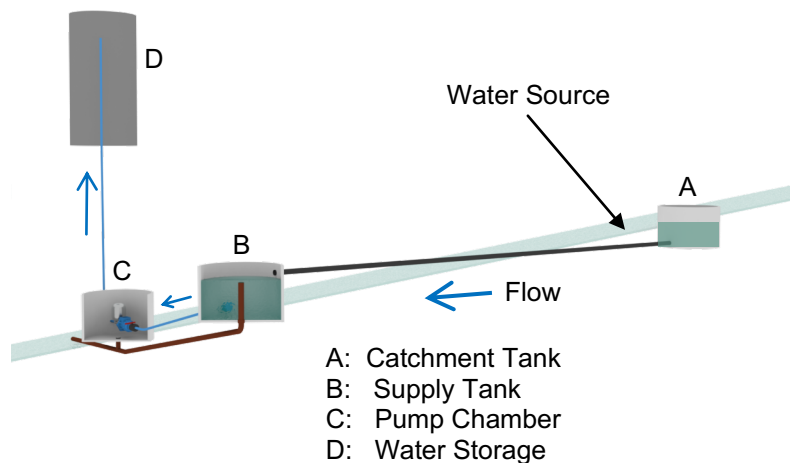
About the Papa pump

Water powered pumping traditionally goes back 1000's of years where it was used primarily for low head irrigation. More recently, from the late 1700's hydraulic ram pumps were developed as an efficient and effective means of transporting water over long distances and great heights where they have been utilised to provide water in most parts of the world prior to the advent of 'previously inexpensive' mains water and electricity supplies. Developed within the UK in the mid-90s, the Papa Pump represents a modern, smaller, lighter and more effective alternative and is used in many countries to provide water for a wide variety of uses. With the addition of the revolutionary composite version, Papa continues to ensure that your water transport requirements are cost-effective and delivered in a reliable and sustainable system.

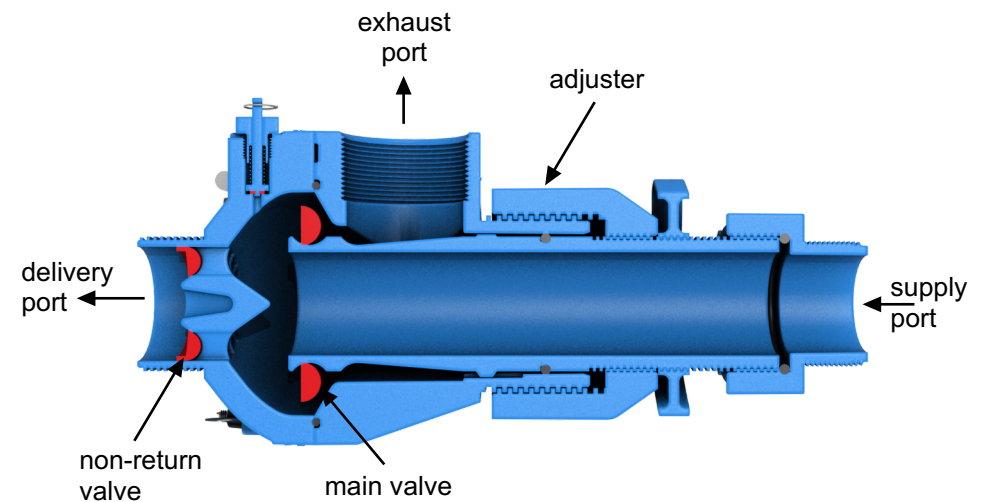
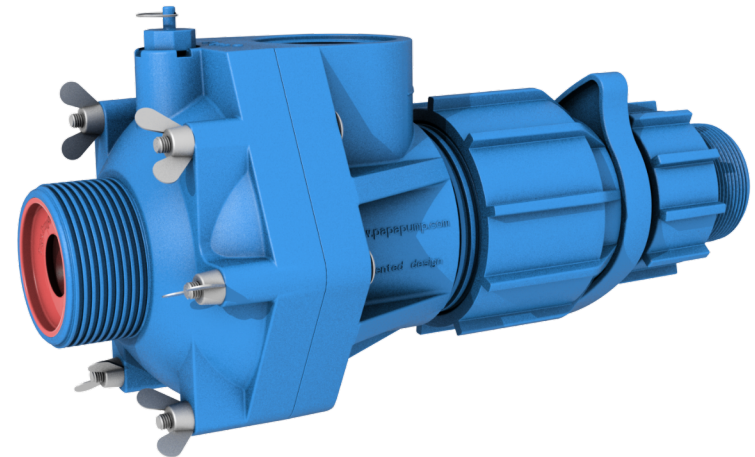
Simple water power

By utilising a naturally flowing water source, the Papa pump is able to transport up to 30% of that water to the desired location, allowing the residual water to be returned to the natural source. With minimal maintenance and zero fuel costs and emissions, the Papa Pump will provide you with a clean and efficient system for your water transportation requirements including agriculture, horticulture, irrigation, domestic and industrial use.

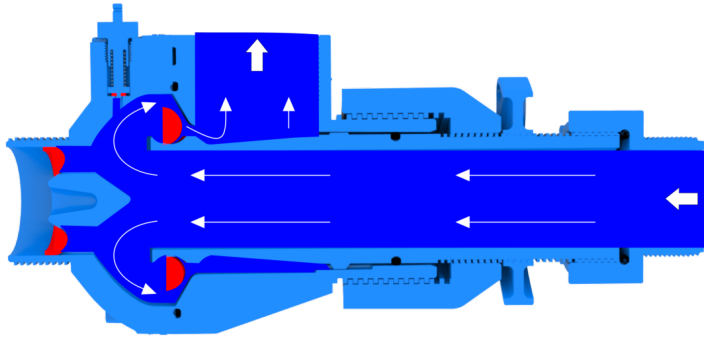
a typical schematic layout for a Papa Pump system



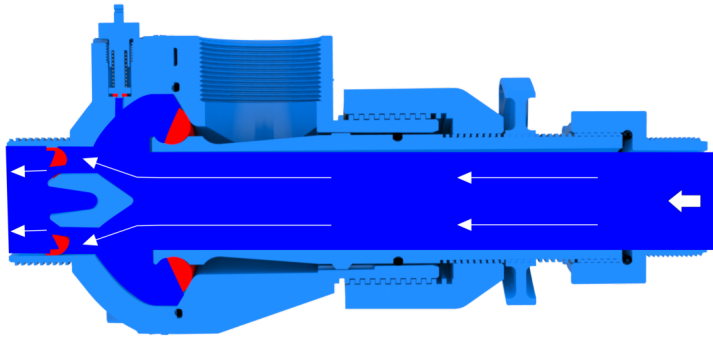
Papa technology



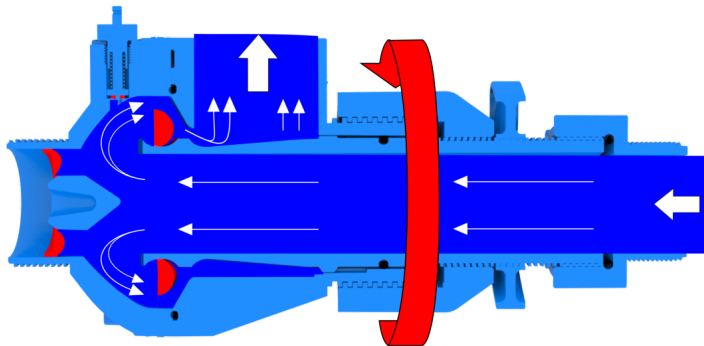
How the Papa pump works



Water enters pump via supply port and flows around main valve to exhaust port.



As the flow increases around the main valve a differential pressure occurs causing the valve to suddenly close. The flow and mass of water is then directed through the non-return valve and into the delivery port at a higher pulsed pressure. This pressure suddenly reduces causing the main valve to reopen and the cycle repeats.



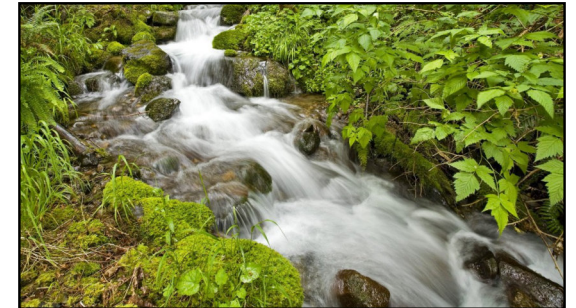
Turning the adjuster to open the valve allows flow through the pump to be regulated so that a greater flow generates a greater pressure and water delivery.

Installation principles

A natural water source is required



river



stream

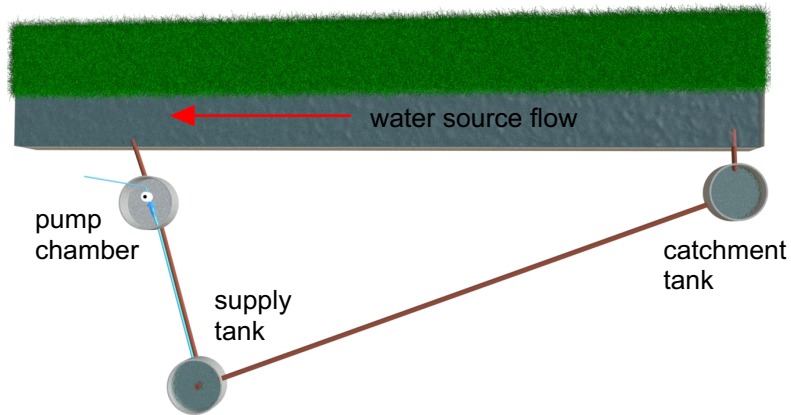


spring

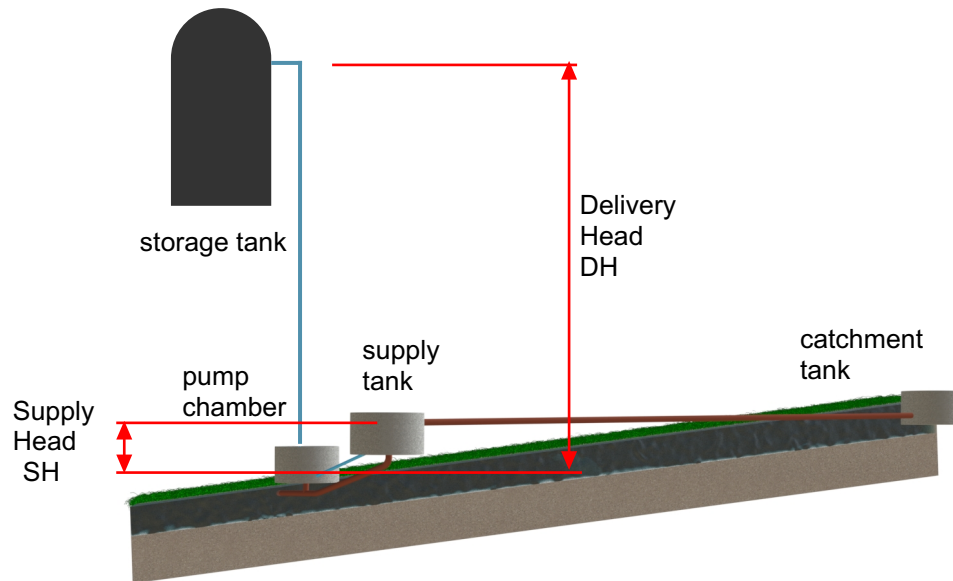


pond/lake

Plan Elevation



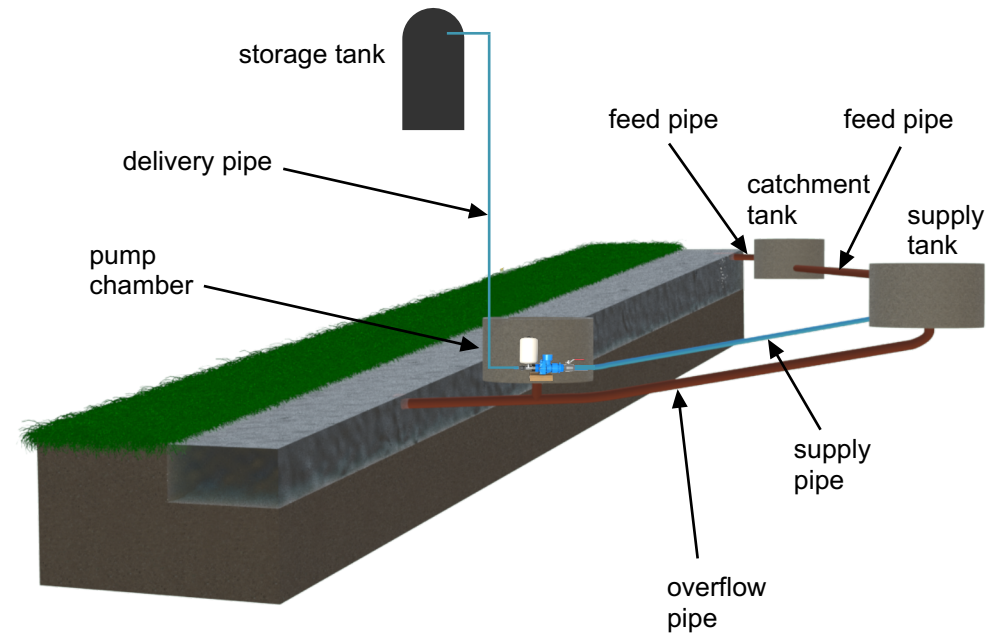
Side Elevation



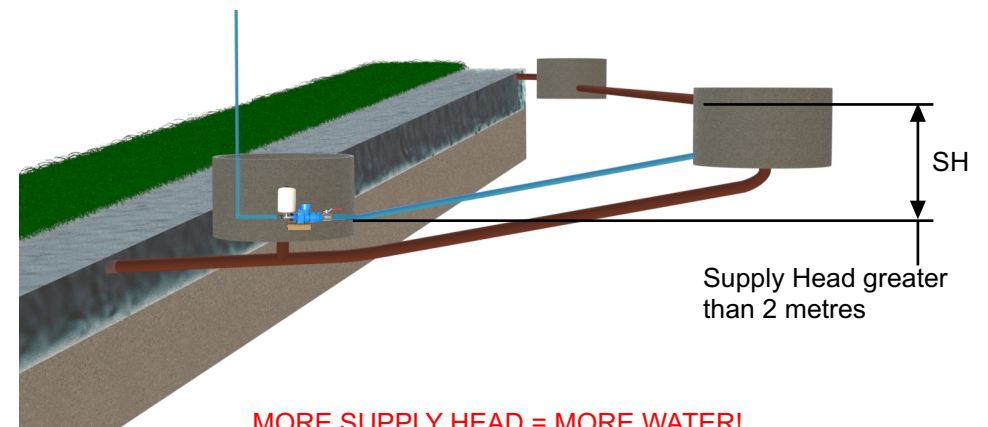
The greater the supply head, the more efficient the pump is!

MORE SUPPLY HEAD = MORE WATER!

Site Layout Overview

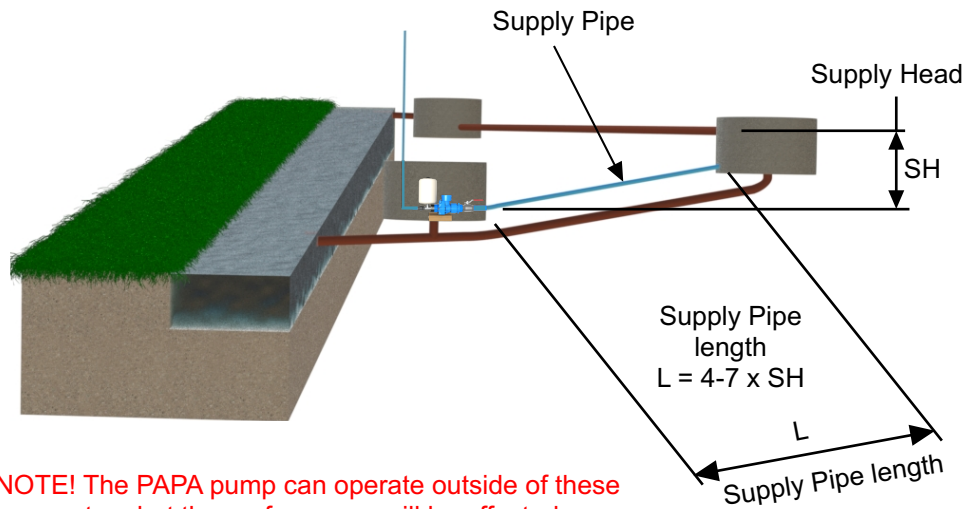


A minimum Supply Head of 2 metres is required, but please ensure that the maximum head is achieved for best results



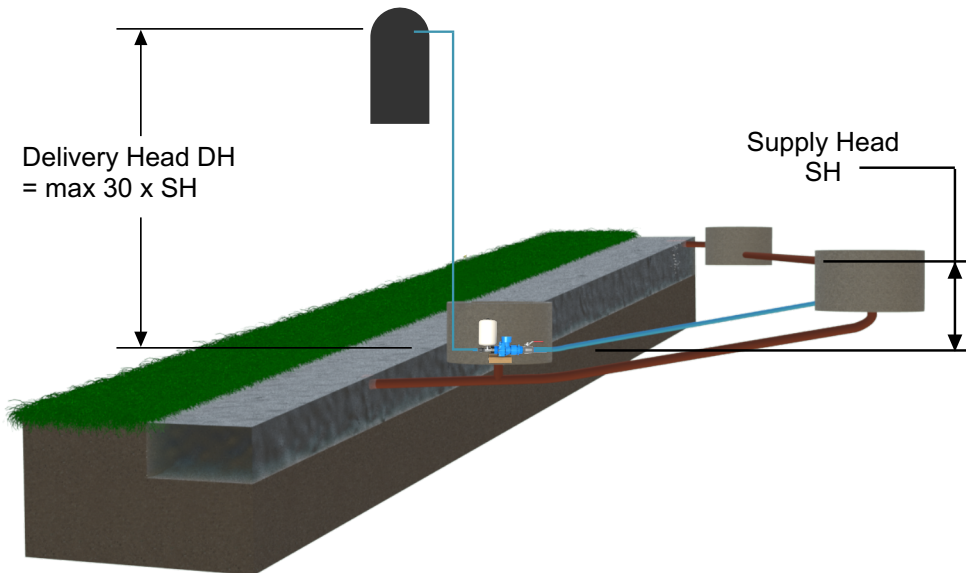
MORE SUPPLY HEAD = MORE WATER!

The Supply Pipe length (L) should be between 4-7 x the Supply Head (SH) for optimum efficiency and pressure



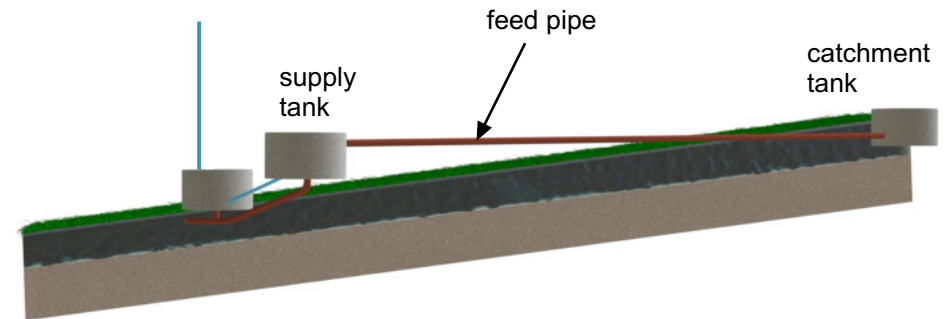
NOTE! The PAPA pump can operate outside of these parameters but the performance will be affected

The maximum Delivery Head (DH) is 30 x the Supply Head (SH)



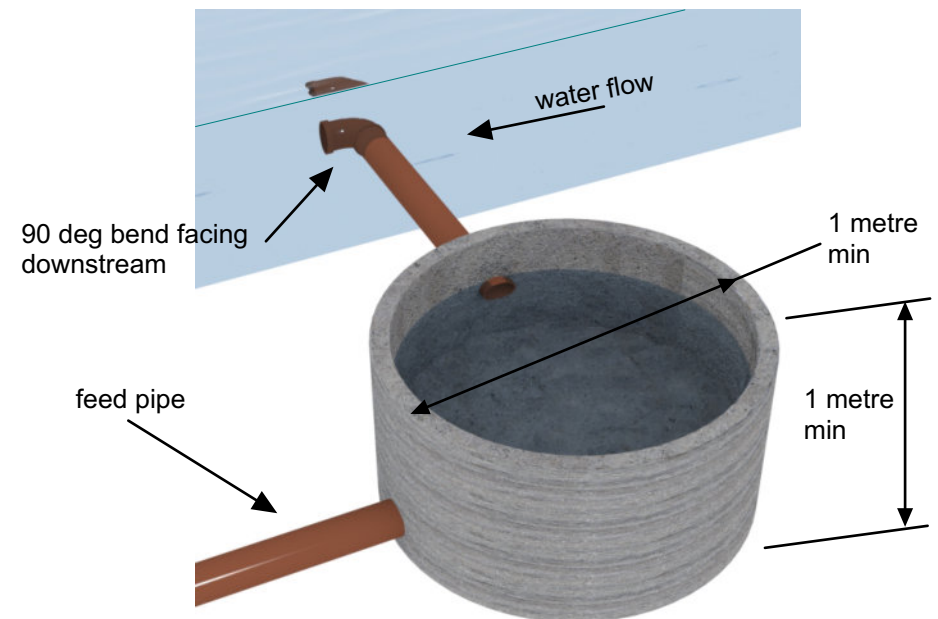
NOTE! Check that the Delivery Head (DH) does not exceed the pressure rating of pipes!

Feed Pipe should be straight with a low gradient (1:500) into the Supply Tank, but check pipe friction chart to establish the most suitable size and gradient.

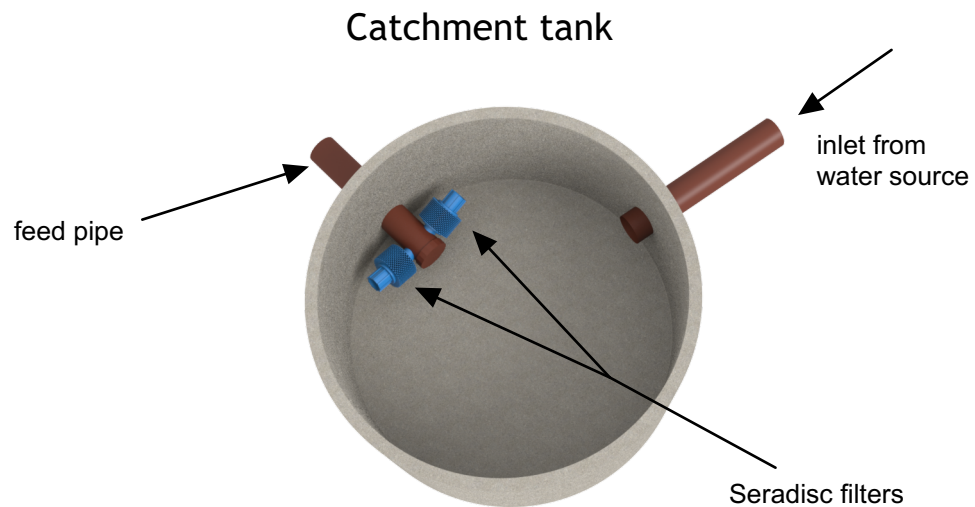
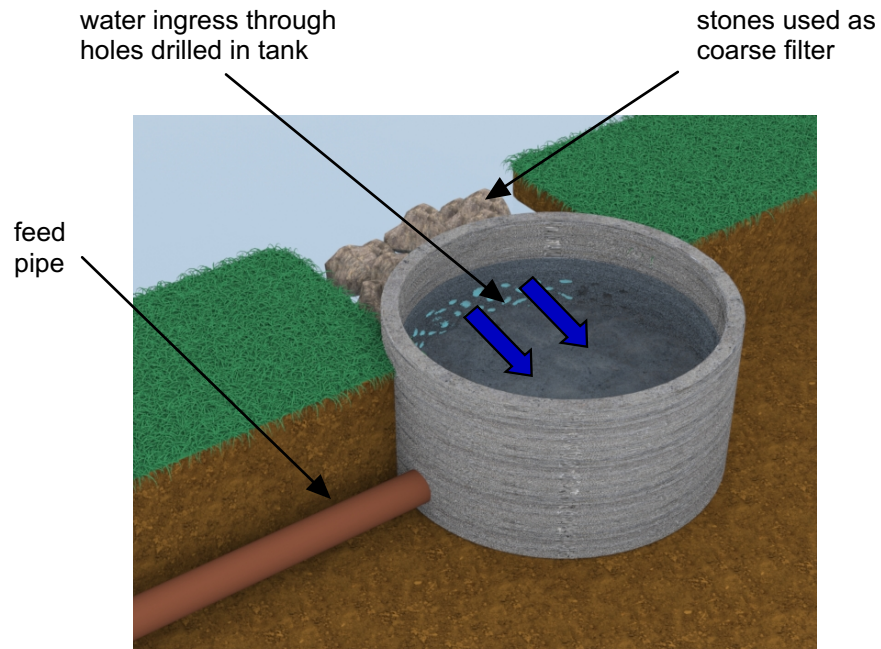


Catchment Tank details & installations

Catchment method 1

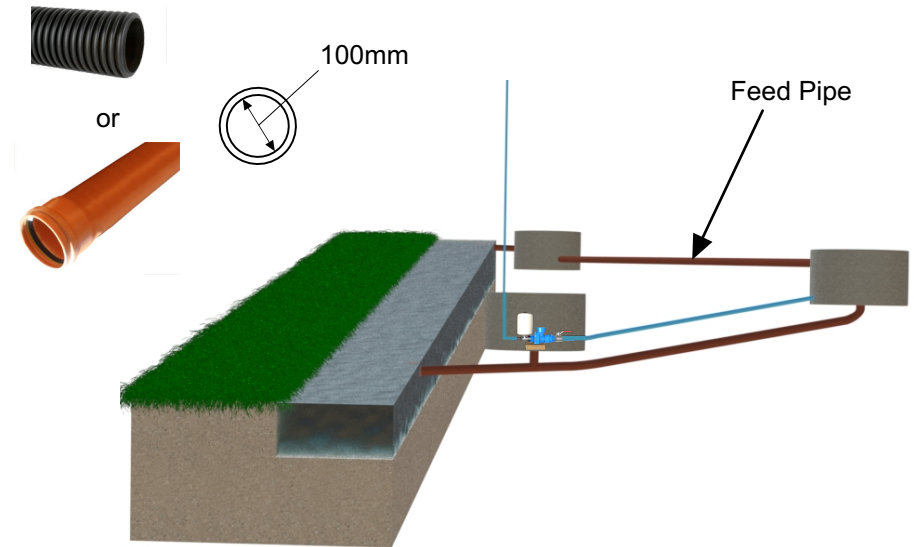


Catchment method 2



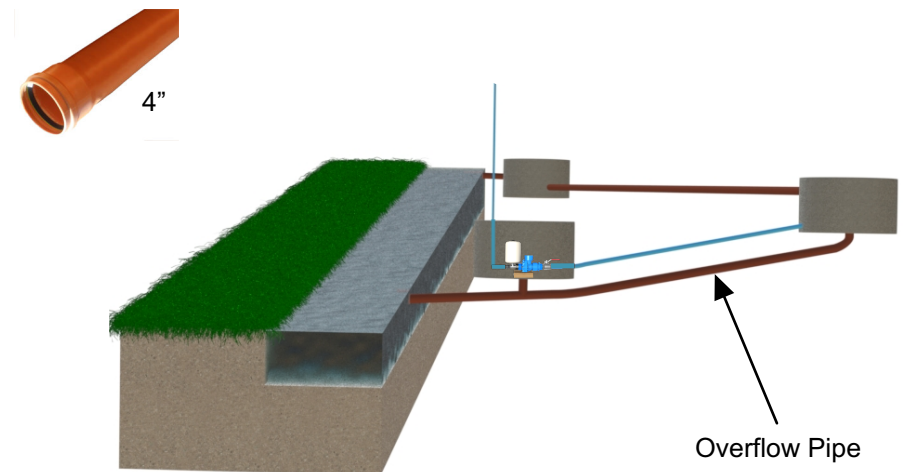
NOTE! The more Seradisc filters fitted, the better the reliability of the system

Feed Pipe



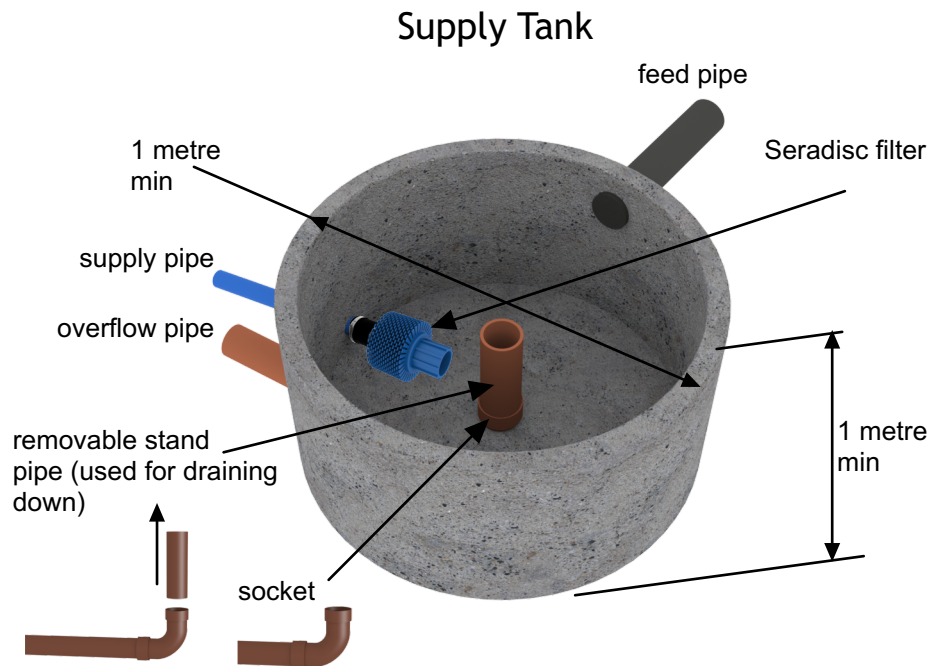
NOTE! Larger diameter pipe may be required for multiple pump installations with more than 2 pumps. Please refer to friction chart. Add more Seradisc filters accordingly

Overflow Pipe

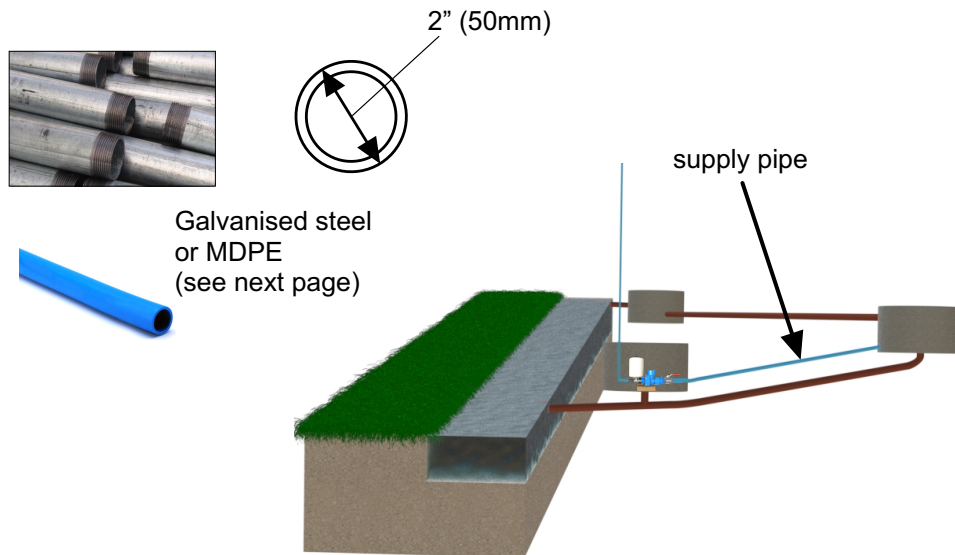


NOTE! Larger diameter pipe may be required for multiple pump installations with more than 2 pumps.

Supply Tank details & installations



Supply Pipe -1



Supply Pipe - 2

IF DELIVERY HEAD (DH)
IS LESS THAN 15m

use 100% Galvanised steel

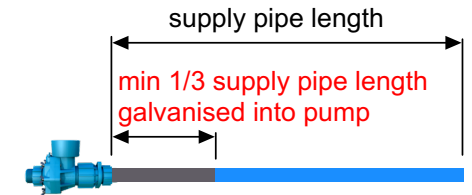


or

MDPE

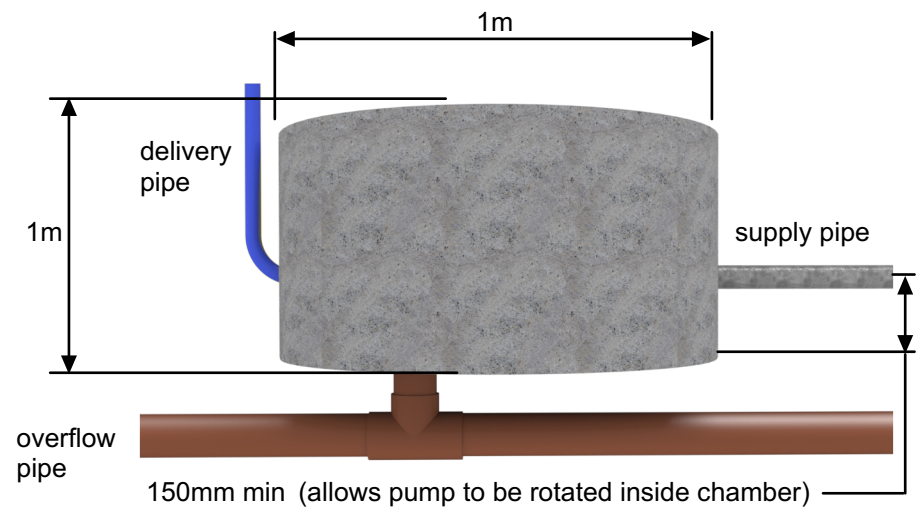


IF DELIVERY HEAD (DH)
IS MORE THAN 15m



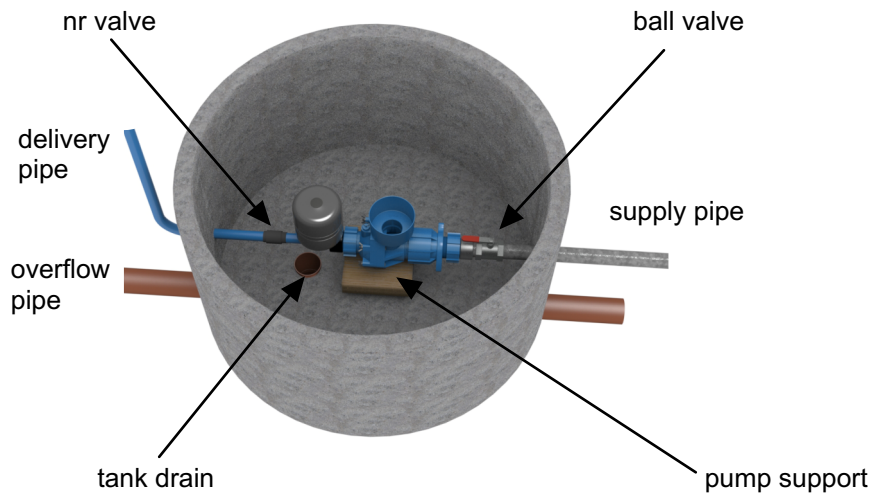
Pump Chamber details & installations

Pump Chamber



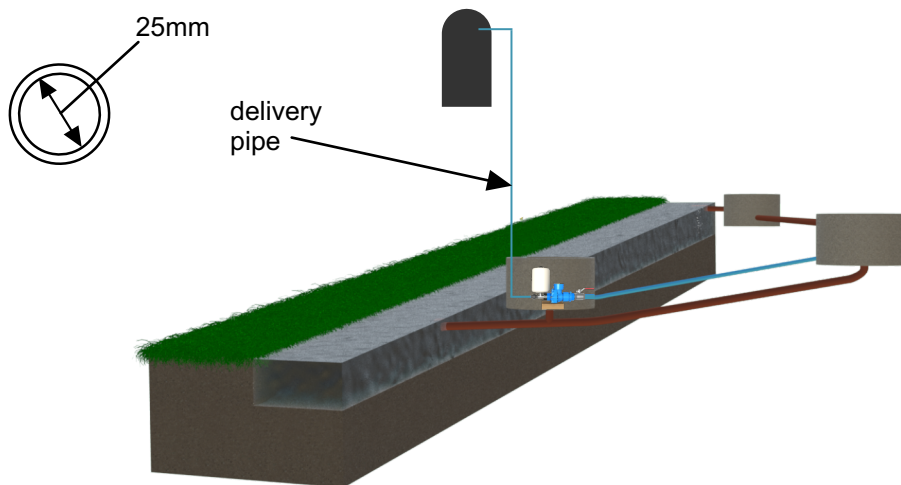
Pump Chamber

Note: Chamber requires a cover if a Sureflow flow valve is fitted



NOTE! 2 pumps can be installed in a 1m diameter ring. Larger rings will be required for additional pumps

Delivery Pipe



NOTE! The diameter of the delivery pipe may vary depending on the number of pumps and distance. Please refer to the pipe friction chart for the appropriate size

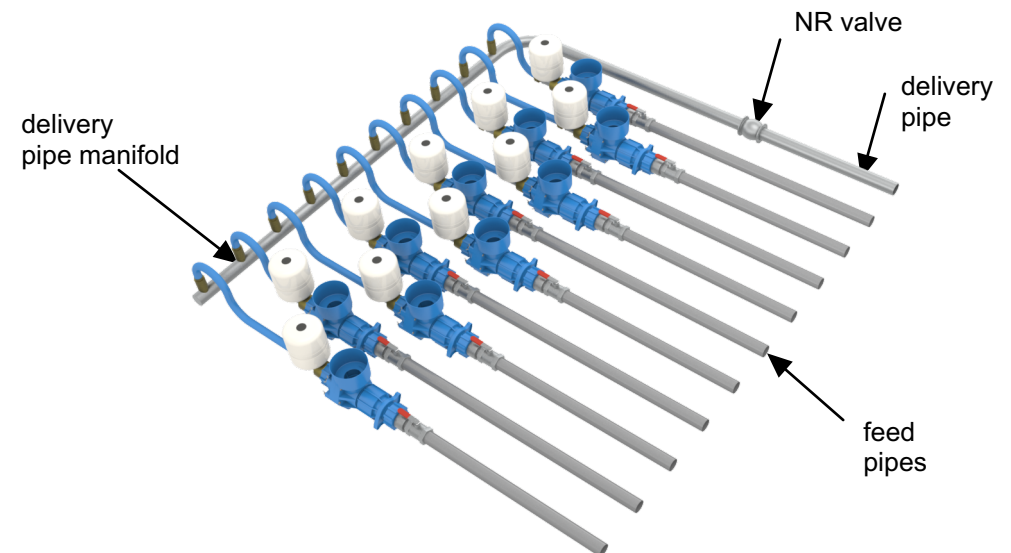
Multiple pump installations

Typical dual pump installation

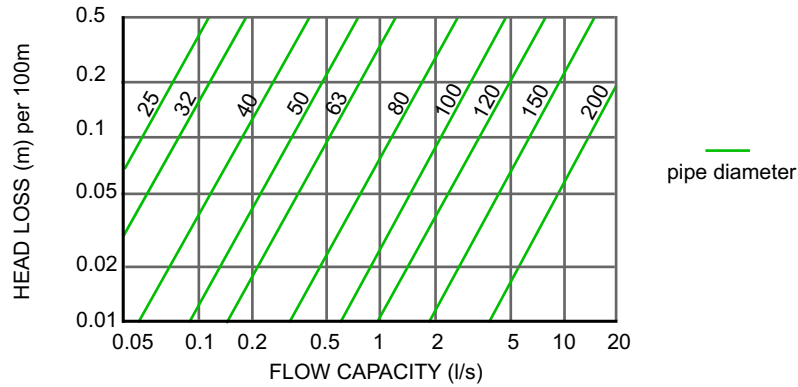


NOTE! Please check delivery pipe size by referring to the pipe friction chart when using multiple pumps or pumping over long distances.

Manifolded multiple pump installation



Pipe friction chart



Pump performance chart

Delivery Head (lift) in metres

Supply Head (Fall) in feet

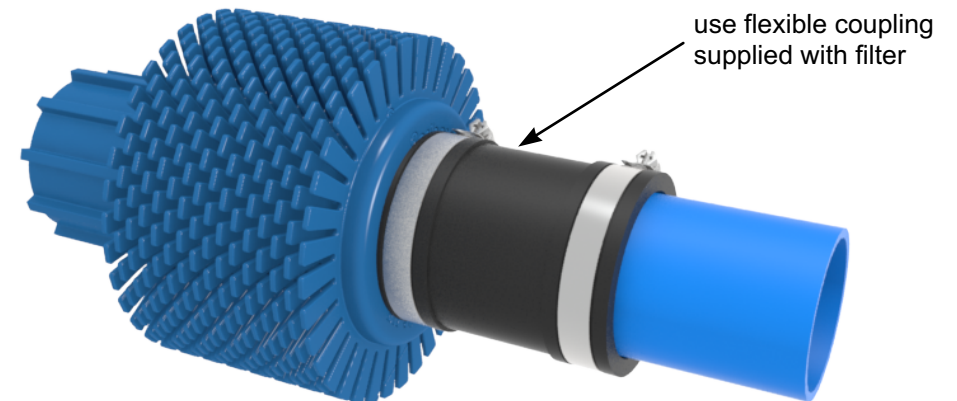
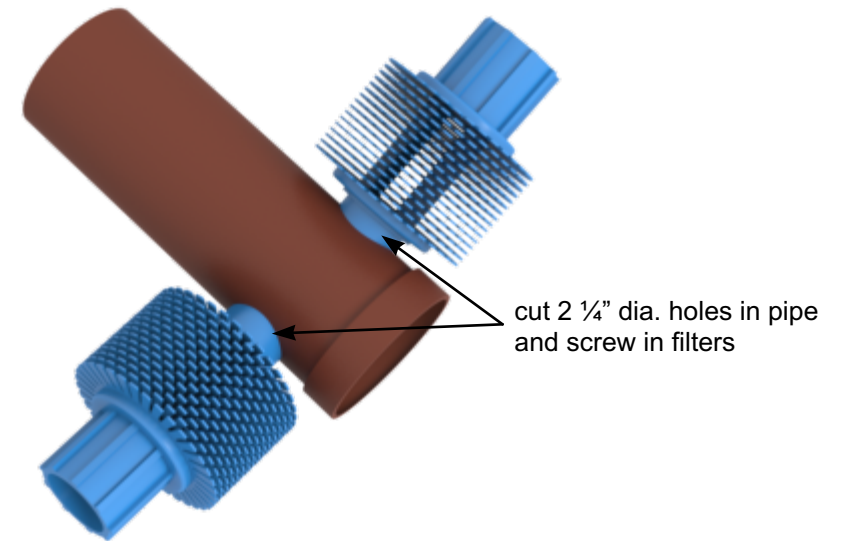
	6	7.5	9	12	15	23	31	46	62	77	92	123	
100									30	24	20	17.5	31
75	* Note: all figures are shown as percentages of available flow								30	22	20	17.5	23
50							30	20	17.5	14	12	9	15
40							24	19	14	11	9.5	7	12
35						28	21	17	12	9.5	8	6	11
30						24	19	14	10.5	8	7	5	9
25					30	20	18	12	9	7	5.5	4	
20				30	24	17	14	9	7	5.5	4.5	3	6
15			30	22	17	13	10	6.5	4.5	3.5	3	2	
10	30	24	20	16	13	8	6	3.5	2.5	2	1.5	1	3
9	27	22	18	14	11	7	5	3	2	1.5	1.5		
8	24	20	16	12	9	6	4	2.5	2	1.5	1		
7	21	17	14	10	8	5	3.5	2	1.5	1	1		
6	18	14	11	8	6	4	3	2	1.5	1			2
5	14	12	9	6	5	3	2	1.5	1				
4	10	7.5	5.5	4.5	3	2	1.5	1					
3	6	5	4	3	2	1	0.5						1
2	4	2.5	2	1.5	1	0.5							
	20	25	30	40	50	75	100	150	200	250	300	400	

Delivery Head (lift) in feet

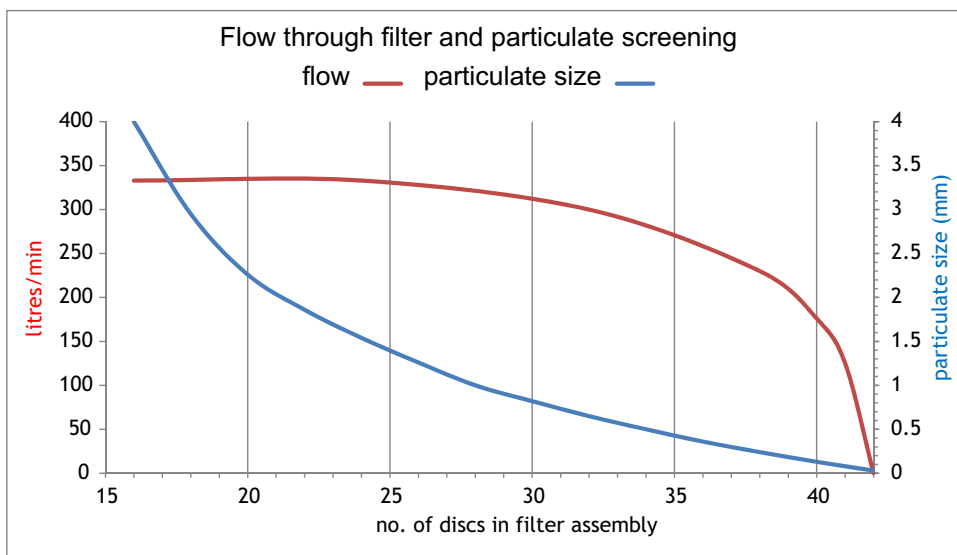
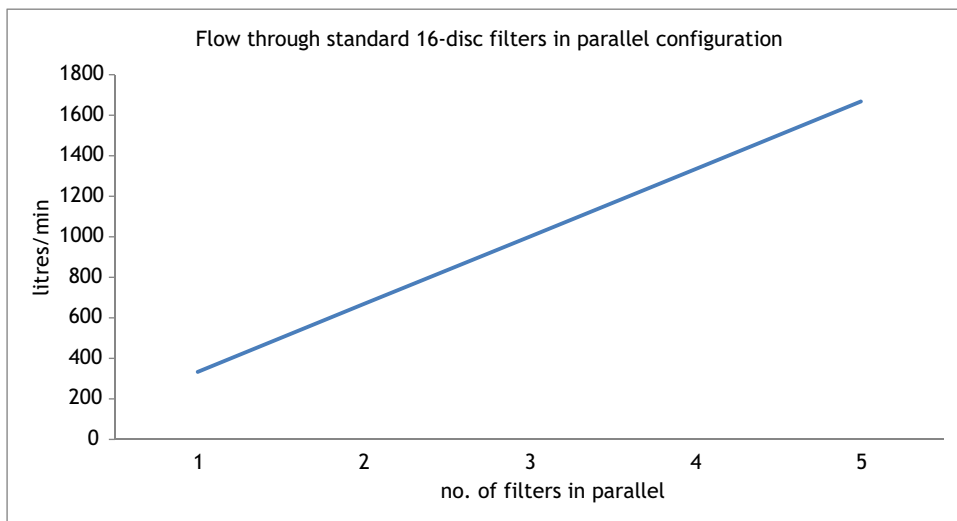
* An average flow through a single pump is 1 litre/sec. (although this can vary with supply heads and pipe lengths)

seradisTM

Installation methods and performance details



NOTE! The more Seradis filters fitted, the better the reliability of the system



Note: Particulate sizes are calculated. Due to the flexible nature of the discs, Seradisc filters fitted with lower numbers of discs may allow ingress of particulates slightly larger than as indicated on the graph.

Installation & commissioning

Delivery Pipework, Tanks and Troughs

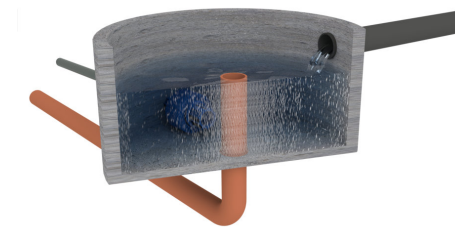
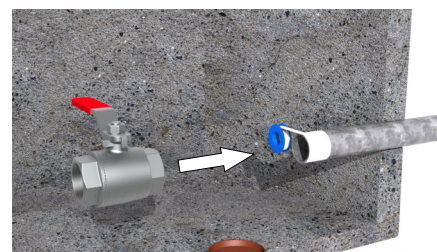
The Delivery pipe should be sized to keep frictional losses to a minimum. A stop valve should be installed at the pump end to allow maintenance and replacement of non return valves etc. without having to drain the whole delivery pipe work.

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 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.

1. Using PTFE tape, fit the 2" lever shut-off valve supplied with the pump onto the supply pipe in the pump chamber.
2. Close this valve and allow the system to fill with water.

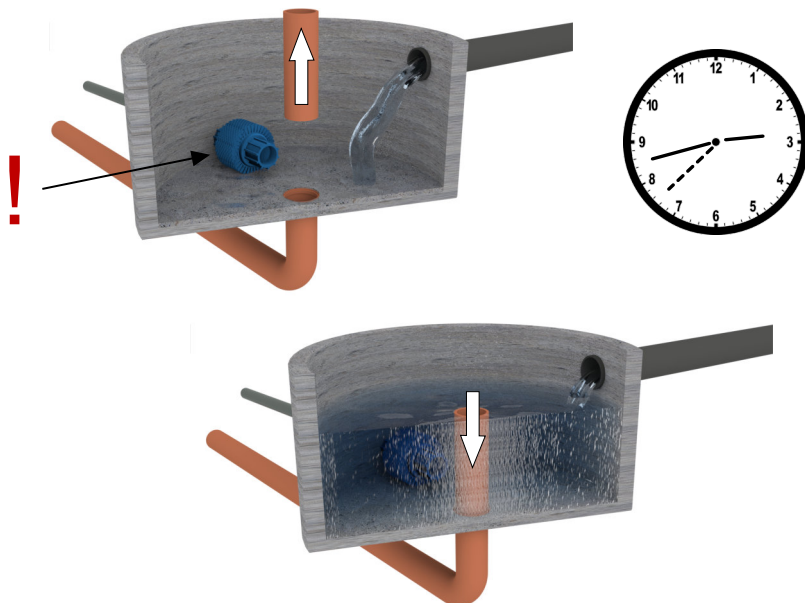


3. When the system is full, open the valve and allow water to exit for while to ensure all debris is washed from within the pipework, then close the valve.



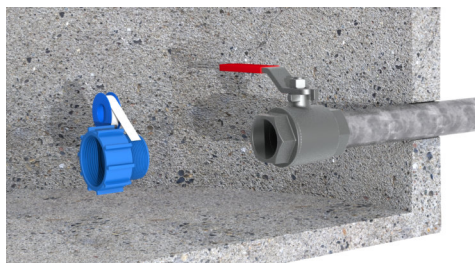
4. Remove the overflow/flush standpipe in the supply tank to allow any loose material to be flushed away, then refit the standpipe and allow the system to refill.

* 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

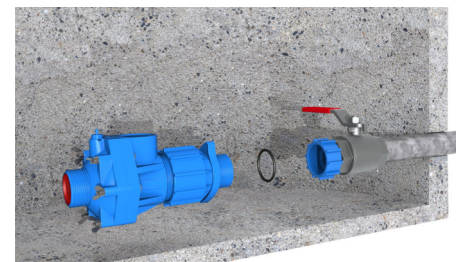


Installing the Papa pump

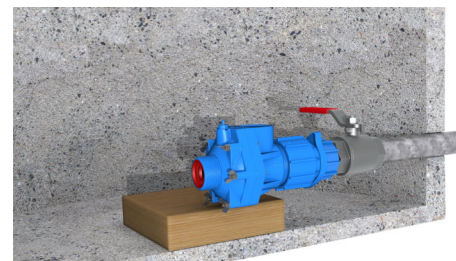
1. Using PTFE tape, screw the 2" BSP adaptor into the 2" lever supply valve.



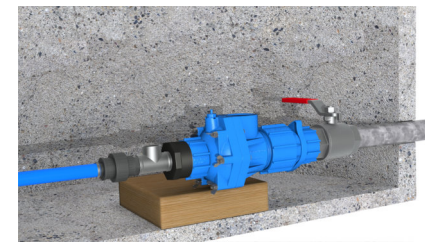
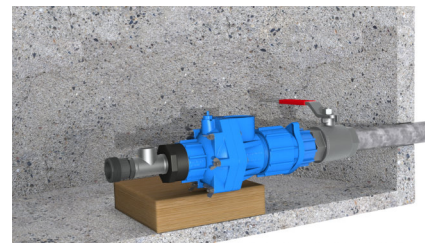
2. Screw the Papa pump into the adaptor until hand tight and adjust the adaptor so that the pump is in the correct position ie with the exhaust facing upwards.



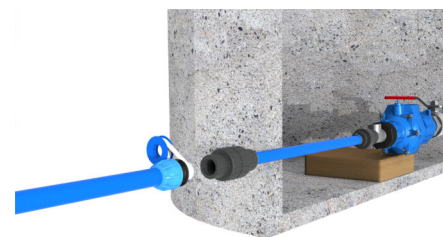
3. Support the underside of the pump with a suitable wooden block to alleviate the weight on the lever valve.



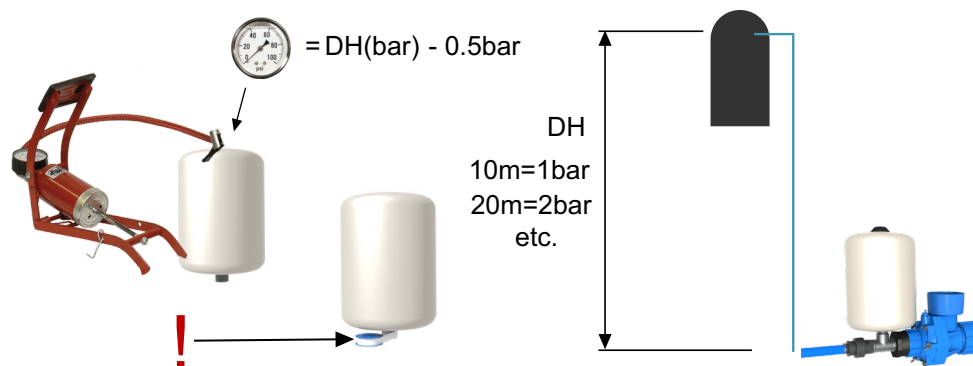
4. Unscrew the release coupling on the hose assembly and attach the assembly to the pump, ensuring that the rubber valves in the pump are present and correctly installed and that the securing tape has been removed. Check that the tee connector is vertical and refit the release coupling.



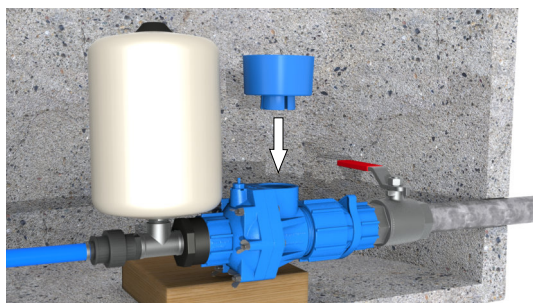
5. Using PTFE tape, install the non-return valve onto a suitable pipe connector and fit to the delivery pipe, ensuring that the pipe is not tight or twisted.



6. Adjust the air pressure in the pressure vessel to 0.5bar below the delivery head pressure (10m head = 1bar), e.g. with a delivery head of 50m, the air pressure will be set to 4.5bar. Using PTFE tape, install the pressure vessel into the delivery tee.

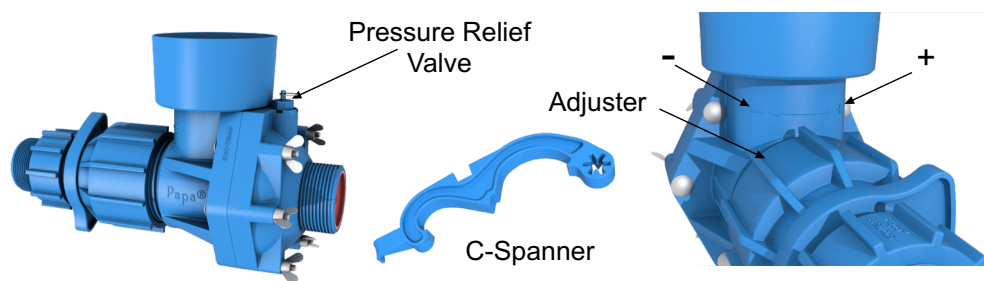


7. Install the exhaust insert into the exhaust port of the pump.



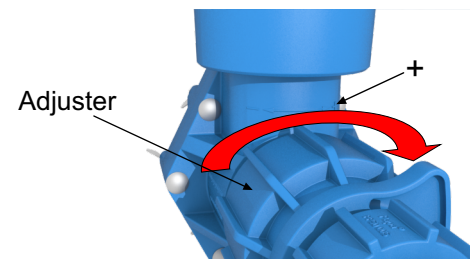
Starting the pump

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 more effectively than systems which have long pipes and gradual gradients.

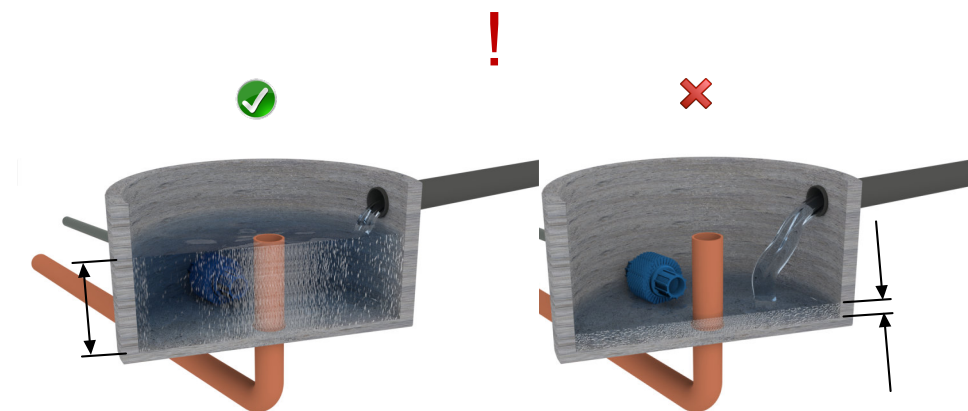
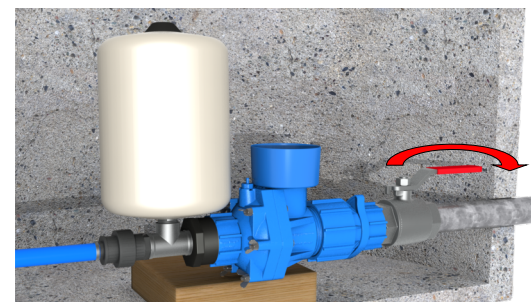


Priming and adjustment

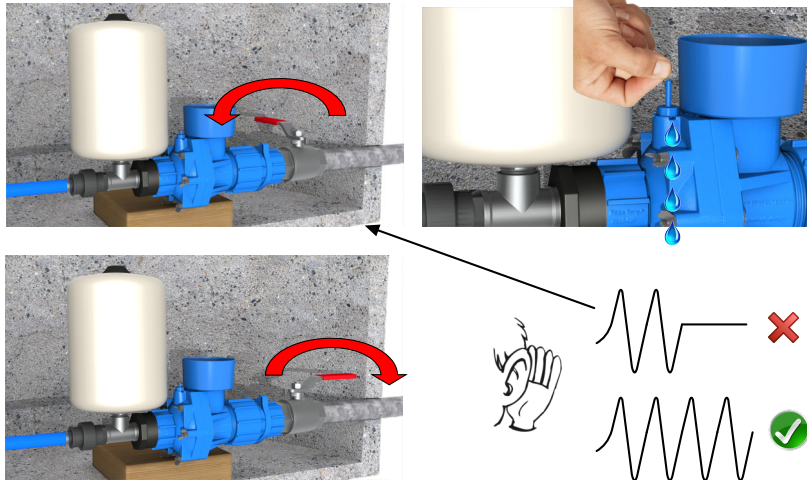
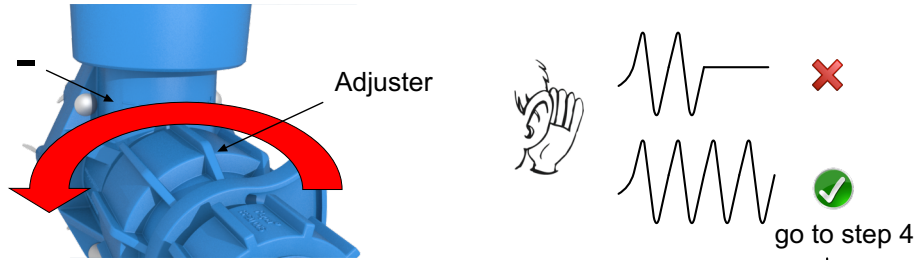
1. Turn the adjuster in the direction (+) to open the pump main valve fully. The 'C' spanner can be used to assist if required.



2. Open the supply lever 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 supply lever valve can be closed intermittently to allow this level to be maintained during the priming process.

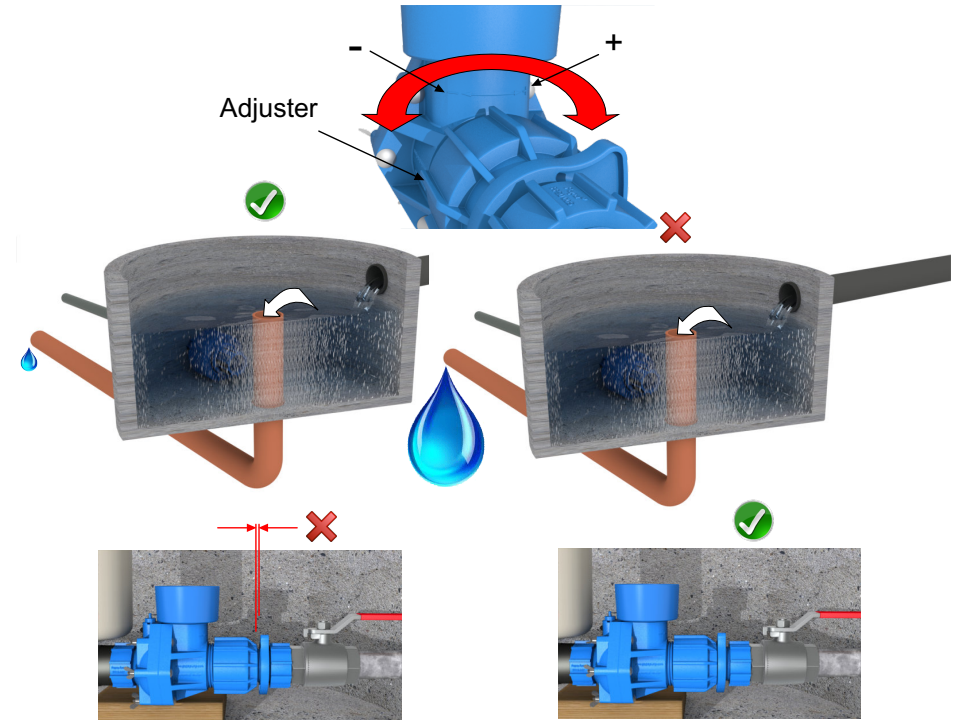


3. With most of the visible air removed, turn the adjuster in the opposite direction (-) until the pump 'beats'. If the pump stops and no further water flows, close the supply lever valve, lift up the pressure relief valve located next to the pump exhaust port, and release. Re-open the supply lever valve. 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. In extreme cases it may be preferable to first prime the whole system using a separate powered pump or pressurised water source to back-fill all the pipe work via the Papa pump exhaust port, although with time and patience priming can always be achieved using the described method.)

Note: After the pump has run, it may require re-adjustment.



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.

General maintenance

Regularly check and clean all inlets and Seradisc filters.

If delivery rates drop, check both the non-return seal and main valve in the pump. Regularly check the air pressure in the pressure vessel.

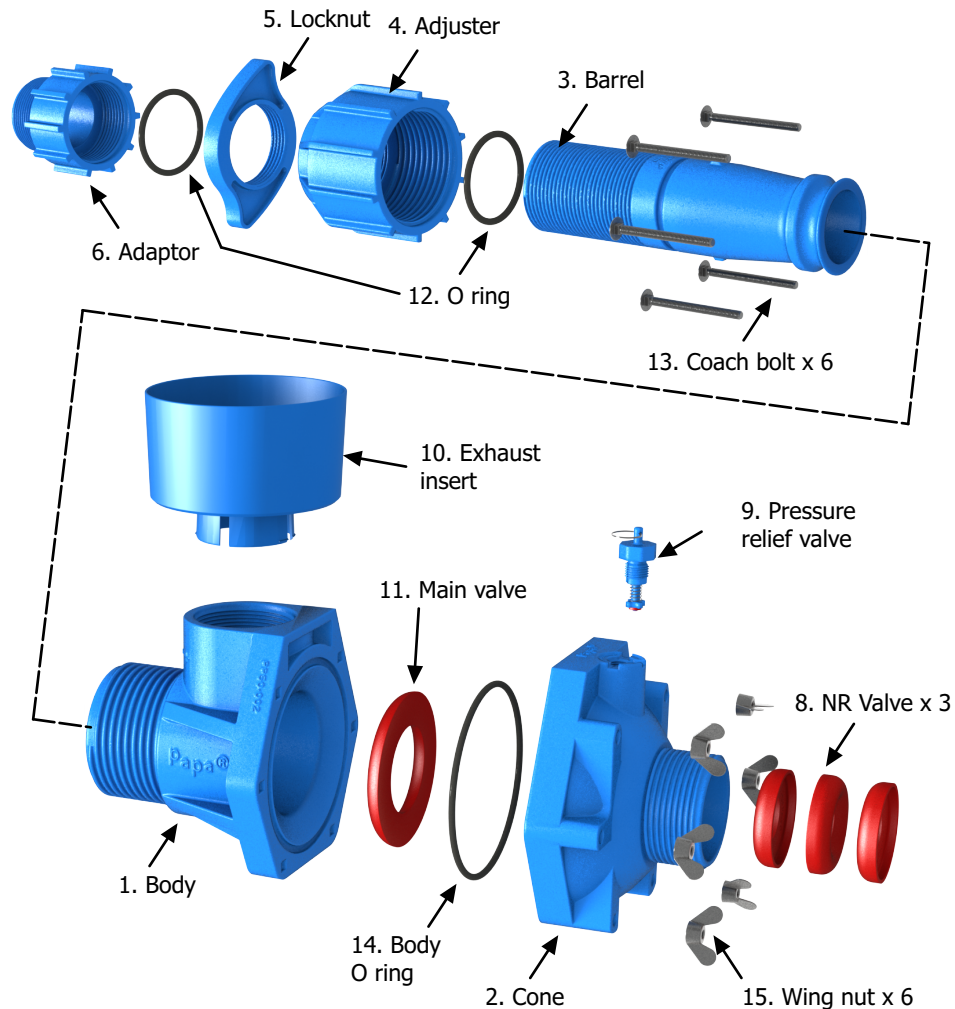
Important: When removing the pressure vessel, first relieve the water pressure on the delivery side to avoid personal injury.

Consult the fault finding section at the end of this manual if faults occur.

Health & Safety

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

Pump parts list

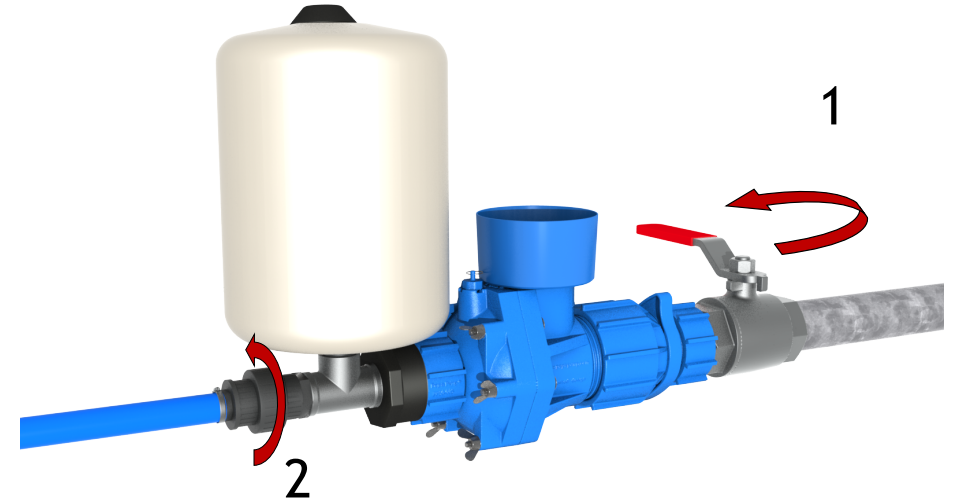


Pump maintenance

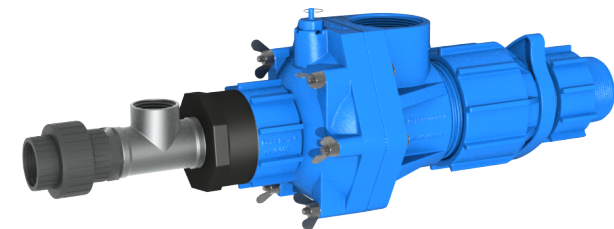
How to change the pump valves

Changing the valves (8) & (11) is a straightforward procedure and can easily be carried out in the field if required. Firstly shut off the water supply to the pump via the supply lever valve. You can now slowly unscrew and separate the coupling (located after the tee) to release pressure. If the pressure is such that the coupling cannot be unscrewed, carefully loosen the worm drive clip nearest the pump securing the hose to the hosetail.

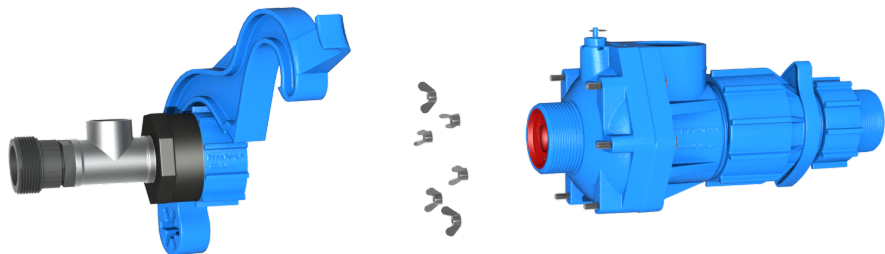
TO AVOID PERSONAL INJURY, DO NOT UNSCREW THE PRESSURE VESSEL UNTIL THE PRESSURE IS RELEASED.



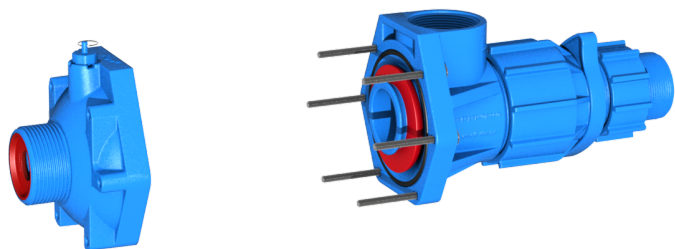
Unscrew the pressure vessel and remove the exhaust insert. Unscrew the pump from ball valve or leave attached if changing the valves in situ.



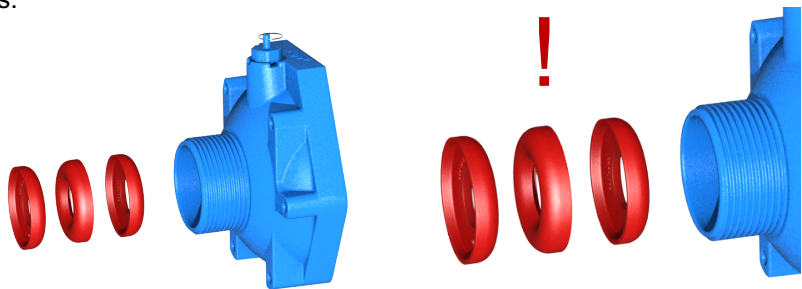
Using the C spanner, unscrew and remove the hose assembly adaptor and wing nuts.



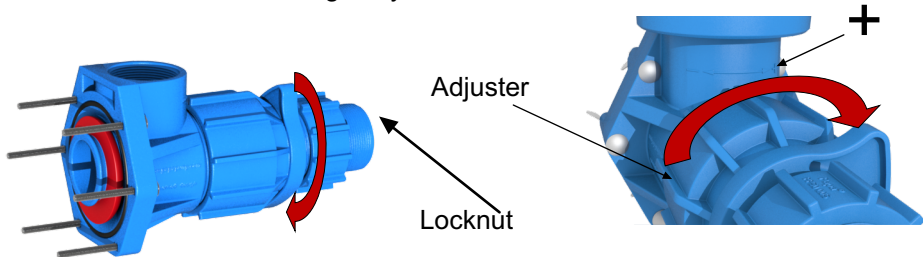
Separate the cone from the body



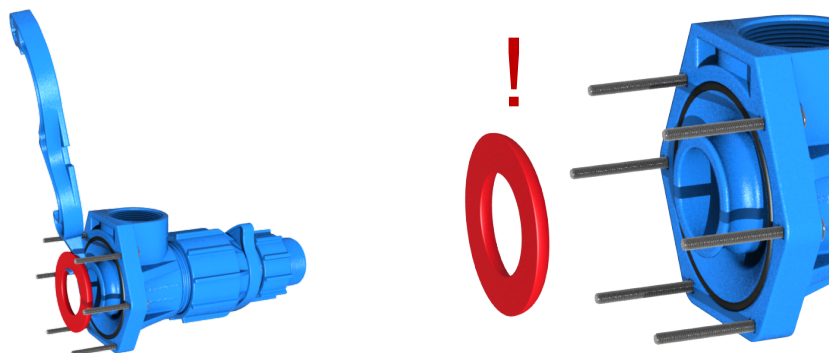
Remove NR valves, noting orientation. Inspect and replace any worn or damaged valves.



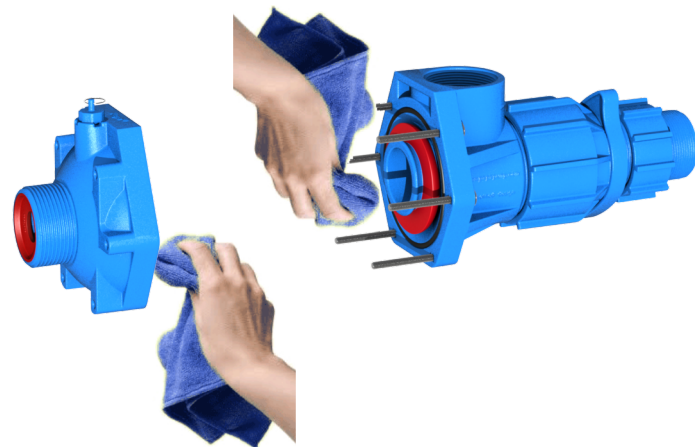
Slacken the locknut, then turn the adjuster toward the '+'. This moves the barrel and main valve forward, allowing easy access to the main valve for removal.



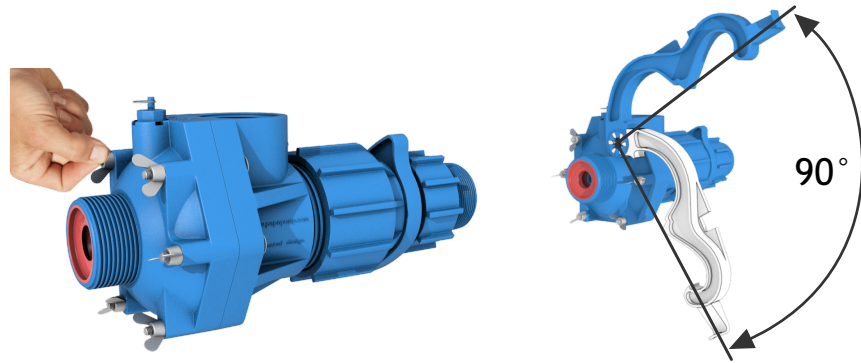
Remove main valve using C spanner, noting orientation. Inspect for wear or damage and replace if necessary.



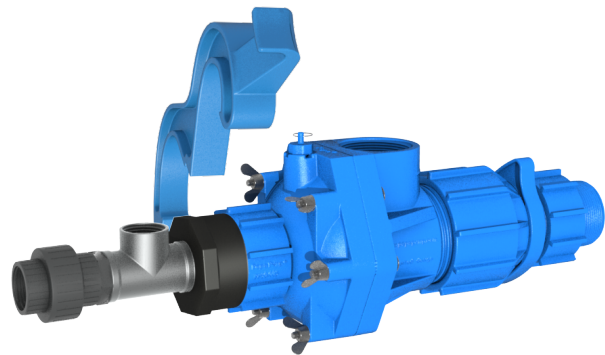
Clean the mating faces of the Body and Cone



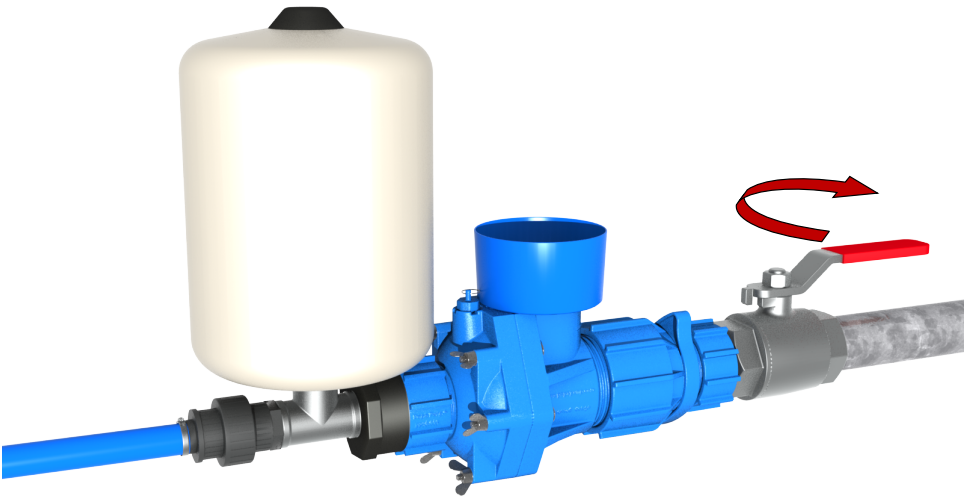
Refit the wing nuts and first tighten by hand. Then, using the C spanner, tighten each wing nut further by turning 90° **ONLY** with the C spanner



Refit the adaptor and hose assembly, tighten using the C spanner



Reassemble the pump to the supply lever valve and the hose assembly coupling. Refit the pressure vessel and the exhaust insert and follow the steps shown in the section “Installing the Papa pump” in the “Installation & commissioning” instructions to restart the pump.



Troubleshooting

Most likely causes, relating to system faults

Legend:

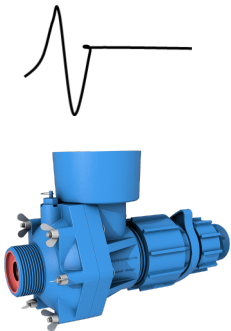
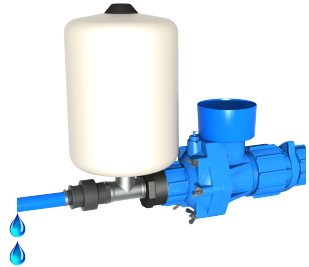
water

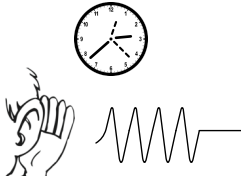
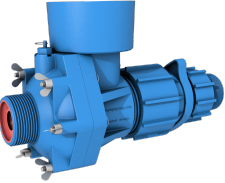

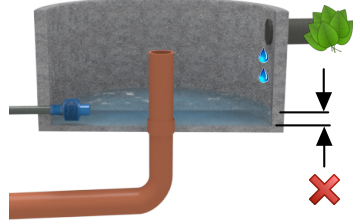
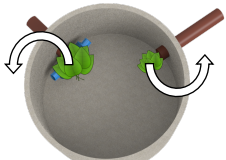
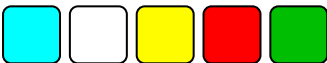
pipes

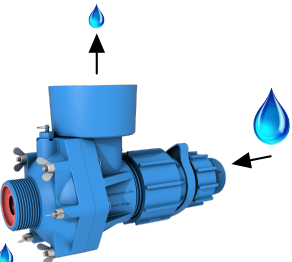

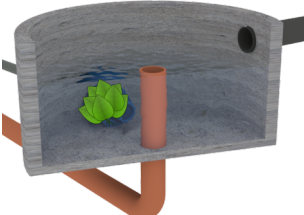
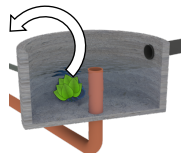

air


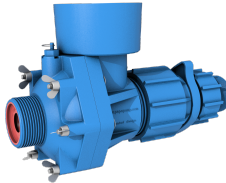
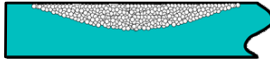
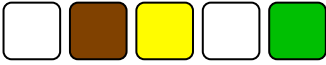
blockage

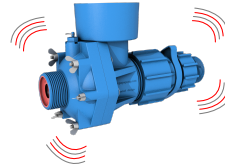
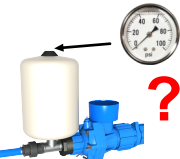
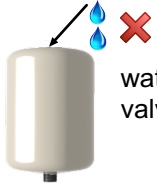
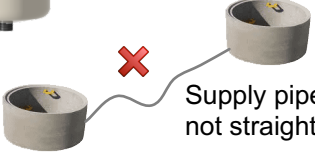
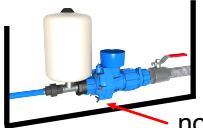



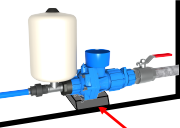

technical

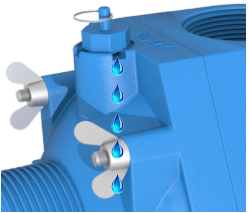
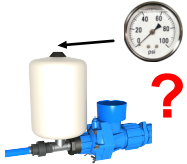





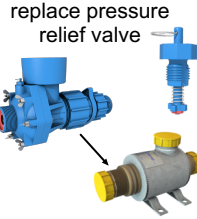
Fault	Common causes	Action
 Pump beats once, then stops	 Low delivery pressure	refer to 'Priming & adjustment' p.25
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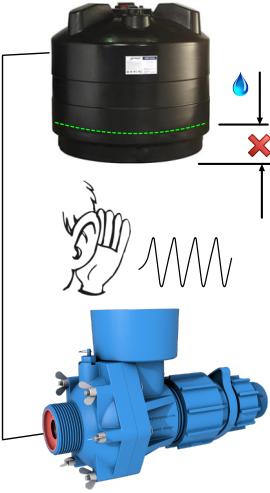
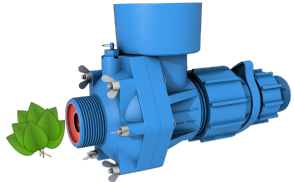


Fault	Common causes	Action
  Pump beats, but stops after a period of time	 Air in supply pipe  Low water level	refer to 'Priming & adjustment' p.25 check water source level ok  clean pipes and filters
		

 Low flow rate through pump	 Air or blockage in supply pipe or pump Check: Supply Head $\geq 2\text{m}$ Check: Supply Pipe = 50mm dia 	refer to 'Priming & adjustment' p.25 refer to Supply pipe requirements p.10  clean filters
		

Fault	Common causes	Action
  Irregular beat	 Air in supply pipe Check: Supply pipe length = 4 - 7 x supply head 	refer to 'Priming & adjustment' p.25 refer to Supply pipe requirements p.10

 Pump shakes excessively during operation	 Check air pressure  water escapes from valve when depressed  Supply pipe not straight  no support	 adjust air pressure if req'd see p24  replace pressure vessel  re-lay pipe  support pump
		

Fault	Common causes	Action
 pressure relief valve leaking	 Check air pressure  water escapes from valve when depressed  pressure relief valve damaged/worn Check: Delivery Head > 100m ✗ Delivery Head < 100m ✓ 	 adjust air pressure if req'd see p24  replace pressure vessel  replace pressure relief valve if Delivery Head > 100m, change to metal pump

 pump beats normally but water delivery low	 check for blockage, damage and wear in pump valves supply pipe length $= 4 - 7 \times \text{supply head}$  supply pipe dia = 50mm 	clear any blockage, replace valves as required refer to pump maintenance p.27 refer to Supply pipe requirements p.10,14 & 15
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Specifications:

Pump housing:

Latigloss®



Valve members/O rings:

EPDM

Exhaust insert

Polypropylene

Max output (l/day):

20,000

Max operating pressure (bar):

10

Weight (kg):

2

Length (cm):

30

Width (cm):

18

Height (cm):

16

Supply/exhaust ports:

2" BSP (50mm nb)

Delivery port:

1" BSP (25mm nb)

Notes

Notes



**Water Powered
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Papa P♥mp®

Water Powered Technology



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