



8 fresh water pumps

Fresh water on tap is a standard creature comfort on modern boats, but pumps can be noisy and power-hungry. Alex Bell tests eight to find out which is best

One of the things often taken for granted on a boat is the fresh water pump. Hidden away from sight, it does its job without fuss, supplying water when required, so long as the tanks are kept topped up.

The one time I do take notice of the pump is in the middle of a quiet night at anchor, or snug alongside, when someone uses the heads and then, quite properly, washes their hands. The water pump starts

up and reverberates through the boat, waking all but the deepest of sleepers. Modern pumps are supposed to be quieter: the question is how much quieter, and how much current do they require to deliver their precious cargo?

There are five players in the pumping world. There's ITT, which sells the Jabasco and Flojet brands, Whale, and Shurflo. Plastimo also sells freshwater pumps but unfortunately had none in stock for testing, and Leisure Accessories, which makes the Floking brand, declined to take part in the test.

WHAT'S AVAILABLE?

Fresh water pumps are usually displacement pumps – ie, pumps that suck fluid into a chamber and expel it in two distinct actions – because they have to draw their supply up from a tank sited low down in the bilges or under a seat

or berth. The pumping action creates a low pressure to draw the water into the pump body, which is then expelled at a much higher pressure sufficient to deliver the water to each outlet in the boat, be it a galley tap, wash basin or shower head.

One of the variables that confront the potential buyer is a variety of flow rates and pressures. Our American cousins, with their love of everything in abundance, like high-pressure pumps capable of delivering vast quantities of water. Europeans are more modest in their needs and tend to go for pumps with lower pressure, typically around 2.2 bar (40 psi). In general terms, the longer the pipe run and greater the 'head' required to be overcome, the greater the pressure required.

The rated delivery size of a pump will depend upon the number of

outlets. For a typical 10.7-12.2m (35-40ft) boat with one shower, a 12 litres per minute delivery is usually deemed adequate.

The other factor will of course be whether you are a blue water cruiser restricting water use, or on day sails, returning to a marina every night with an ample supply of fresh water to top up the tank(s).

HOW THEY WORK

All the pumps tested utilise the same basic mechanism: all have non-return valves to keep the system pressurised. Once an outlet is opened the pressure falls in the system and the pump automatically switches on (lower limit), and continues until the outlet is closed. The pump cut-out switch then switches off as the pressure reaches the upper limit.

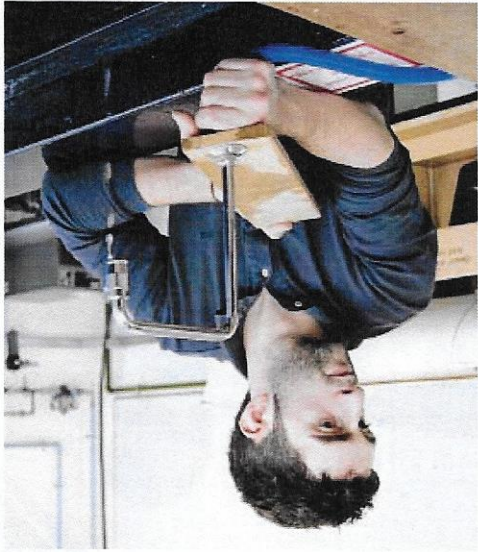
Any leaks in the pipes will cause the pump to top up the pressure

ABOUT THE AUTHOR

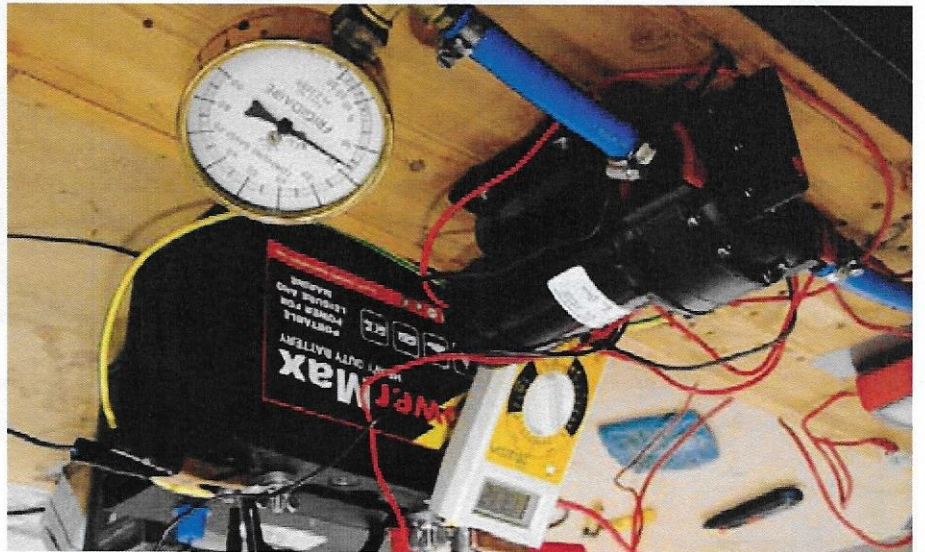


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The low flow rate 'chatter test'



For each pump, we monitored pressure, voltage and current consumption

use. As the water expands in the calorifier it will lift a spring-loaded relief valve. Care needs to be taken that the maximum pressure in the fresh water pump doesn't cause this valve to open and thus waste water.

HOW WE TESTED THE PUMPS

We set the pumps up in a laboratory with a 12V lead acid battery as a supply. The battery was coupled up to a battery charger to maintain a fairly constant voltage.

We pumped the water from an open box, raising it 0.4m over the box side and back down to the pump. We timed how long it took to pump 10 litres of water up one metre to a tap and then 2m to a shower nozzle. We noted the maximum current drawn, and the

Our thanks go to Martin Walker of Aquatex Hamble for loan of equipment and Nicholas Gifford (a BSc student at Southampton Solent University) for help with the test.

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intermittently. That's the 'phantom in the night' phenomenon. At best, the leak might be the pump's non-return valve: at least in this case the water goes back into the water tank! High-pressure pumps especially will find the weaknesses in any system.

PUMP INSTALLATIONS

Fresh water pumps should ideally be located in a dry place as close to the water storage tanks as possible. All require a filter on the inlet side or the warranty is invalidated. Flexible hose should be used for the connections to the pump to absorb vibration. The four feet on a horizontal surface or with all four feet mounted vertically on a bulkhead, either lengthways or up on end, in which case the pump body should be at the lower end. If fitted, the calorifier is plumbed on the delivery side of the pump. I would always try to install them horizontally on all four feet as the rubber feet inserts will work better that way. Having said that, we didn't detect any difference in noise levels of pumps mounted vertically or horizontally.

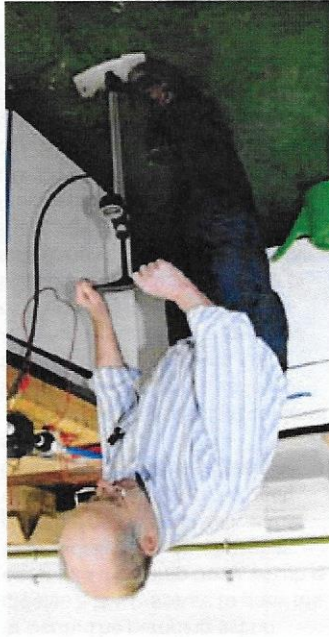
CALORIFIERS

After the accumulator, the pump delivery pipe will divide to go to the various outlets on the boat. For boats with a hot water system this will include a calorifier (water heater) which usually uses the engine cooling water passing through a coil to heat the water. An immersion heater is often added for mains power marina

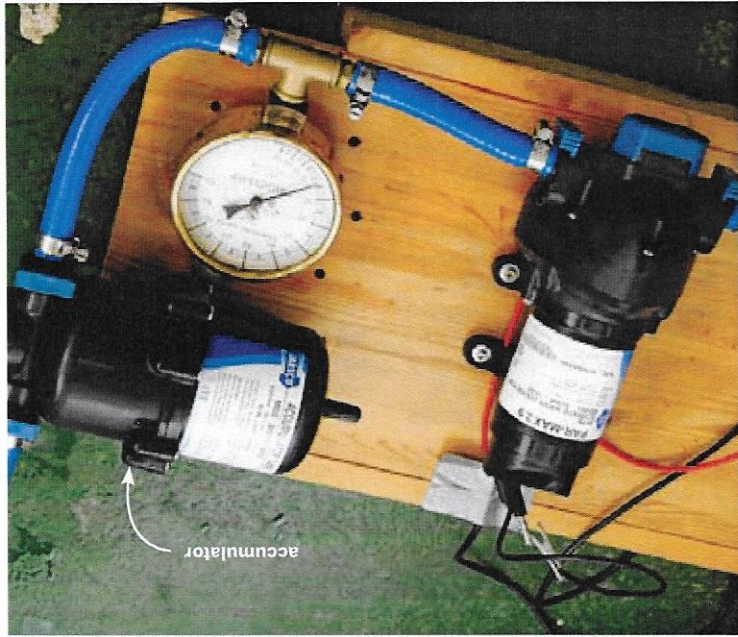
principle that air can be compressed, whereas water can't. As the pump delivers water it compresses the air in the space at the top of the accumulator, usually separated by a rubber diaphragm. The pump switches off when it senses pressure higher than the upper set figure. When a tap is opened, the air in the accumulator expands, driving water out until the pressure falls below the pump's lower set point. The air pressure in

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A bicycle pump can be used...



... to pressurise the accumulator (right), used to smooth the pump's output

FRESH WATER PUMPS

Prices quoted are RRP and can usually be bettered by shopping around

Flojet 4405 Series

PRICE: £118.21



Jabsco Par Max 2.9

PRICE: £66



A bestseller, the Par Max 2.9 represents excellent value for money. The three-chamber pump is driven by a permanent magnet motor, and comes with a built-in bypass which is claimed to reduce the need for an accumulator. Instead of using rubber inserts, the feet of this unit are soft to absorb movement. It comes supplied with 300mm length of cable and 13mm push-in hose connectors or Hep₂O connectors.

On test we found it performed well without an accumulator, but did benefit from the addition of one. Performance was below average of the pumps on test for delivery and was slightly above average for current consumption, but equal quietest with the Flojet for noise.

Jabsco Par Max 3

PRICE: £121.30



The next size up from the Par Max 2.9 but, costing nearly twice as much, this pump is designed to serve three or more outlets and comes with a four-diaphragm pump chamber. The feet are four slide-in rubber pads that attach to a plastic flange. The two push-in ports come with a hose connector or 13mm threaded Hep₂O connectors. The motor is a permanent magnet type and has an effective cable length of 250mm. The unit delivered more litres per minute than the average of the pumps, used slightly more current and was just slightly noisier than average. On the 'chatter' test, it greatly benefited from the use of an accumulator.

Johnson Aqua Jet WPS 4.0

PRICE: £172.58



SMART PUMPS

Shurflo Extreme Series

PRICE: £225.31



Whale Fresh IC

PRICE: £209.99



Shurflo Aqua King Standard 3.0

PRICE: £115.96



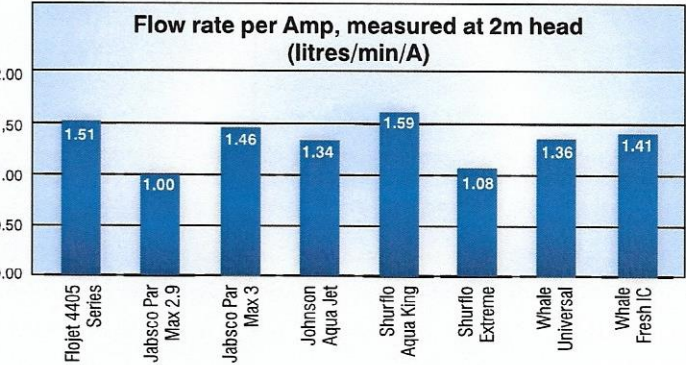
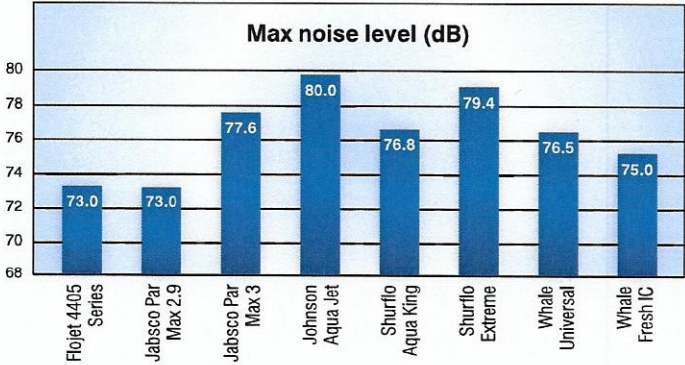
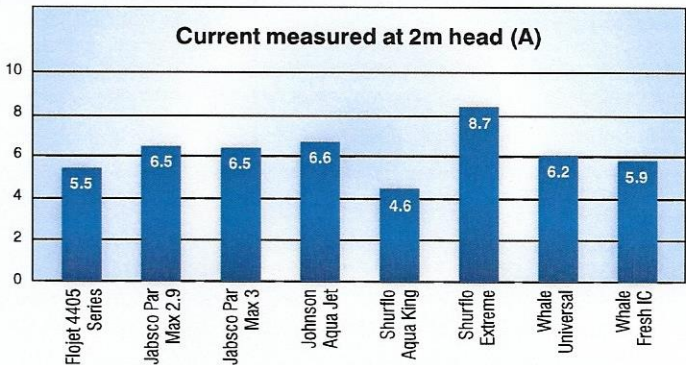
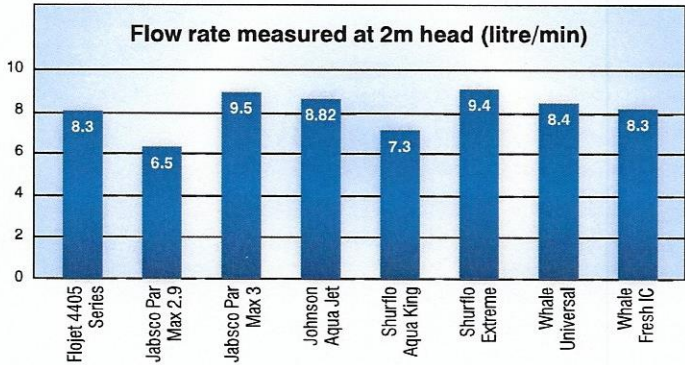
Whale Universal

PRICE: £96.99



PUMP DATA AT A GLANCE								
Make	Flojet	Jabsco	Jabsco	Johnson	Shurflo	Shurflo	Whale	Whale
Model	4405 Series Smooth Water Flow	Par Max 2.9	Par Max 3	Aqua Jet WPS 4.0	Aqua King Standard 3.0	Extreme Series	Universal	Fresh IC
Number of chambers	4	3	4	5	4	4	4	4
Shut-off pressure (bar)	2.4	1.72	2.76	2.1	3.0	3.4	3.0	2.5
Flow rate quoted @ 0m (litre/min)	12.50	11.00	13.20	13.00	11.30	15.10	12.00	14.00
Flow rate measured @ 1m (litre/min)	10.53	9.52	12	11.76	9.0	11.3	10.17	10.34
Max pressure measured (bar)	2.76	1.93	2.34	3.03	3.6	3.2	6.2	3.93
Maximum lift (m)	1.83	3	3	2	1.8	1.8	3	3
Dimensions: H x W x L (mm)	95 x 160 x 208	121x152 x 229	100x106x196	110 x 214 x 240	118 x 127 x 184	127 x 136 x 210	125 x 175 x 240	132 x 174 x 237
Weight (kg)	1.8	1.6	2.1	2	1.8	2.6	2.4	2.5
Current quoted	3.9A @ 0.7 bar	4.4A @ 0.7 bar	6A @ 0.7 bar	4A @ 0.8 bar	5A	9A	4.7A@0.7 bar	4.7A@0.7 bar
Max noise level (dB)	73	73	77.6	80	76.8	79.4	76.5	75
Warranty (years)	2	3	3	3	3.0	3.0	2	2

TEST RESULTS



PBO VERDICT

One of the most marked differences we noted was the range of currents consumed by the pumps. Shurflo occupy both ends of the spectrum, with their Extreme Series consuming nearly double the 4.6A needed at 2m head by the economical Aqua King Standard. The average current consumed by the pumps working at 2m head was 6.31A.

The maximum pressure recorded by the pumps varied, the average being 3.37 bar. The lowest was the Jabsco 2.9 at 1.93

bar but the Whale Universal topped a massive 6.2 bar.

I expected the pumps with more chambers to be quieter. However, the Jabsco three-chamber pump proved to be as quiet as the four-chamber Flojet, while the five-chamber Johnson Aqua Jet was the noisiest. The test also demonstrated the benefits of using an accumulator to smooth water flow and reduce the amount the pump had to switch on and off. Only the Whale IC Fresh Water didn't benefit from being coupled up, so a saving of around £50 can

be made there. On a boat with multiple shower and tap outlets the Shurflo Extreme and the Whale IC Fresh Water are likely to come into their own, being able to pump copious amounts of water or happily deliver small quantities.

Best flow rates are obtainable from the Jabsco Par Max 3 or the Shurflo Extreme, but our Best Buy has to

go to the Flojet, whose frugal current consumption, high flow rate and quiet operation give it the best overall performance. Best Budget Buy, however, goes to the Jabsco Par Max 2.9, below, which although delivering the lowest flow rate per amp on test does so quietly and at half the price of our Best Buy.

