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Guide to Shower Booster Pumps

Don't buy or install a shower booster pump without understanding the pros, the cons and the pitfalls

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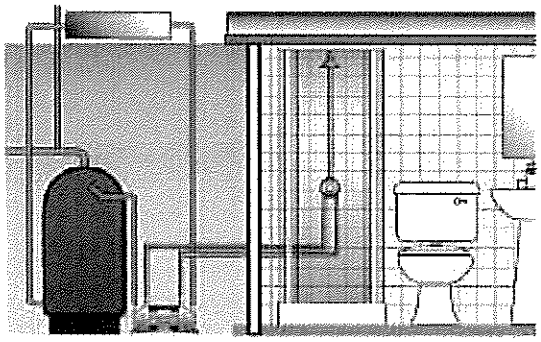
There are various considerations if you are thinking about installing a shower booster pump. Here is a useful guide to help you get the most out of your purchase while avoiding common pitfalls.

Introduction

Booster pumps are widely used to enhance the experience when taking a shower. Not all people like to have water hurled at them at high velocity, while others prefer to feel as though they've been blasted with a pressure washer. There may be some sort of sadomasochistic forces at work here, or just the enjoyment of having your skin massaged with jets of water. Whatever it is for you there are a few simple yet important factors to take into account otherwise you may end up regretting your investment.

A shower booster pump may only be used on a gravity fed system.

This is where the supply to the pump emanates from a header tank (also known as a cistern) often sited in the loft. It is in contravention of Water Bye Laws to try and increase the performance (pressure or flow rate) of a system directly fed from the rising main.



More specifically...

If you have a mains pressure hot and/or cold water system you **may not** add a pump in an attempt to make it more powerful (this is why you should be mindful of your supply pressure and flow rate when opting for a mains pressure system. You do not have the option of boosting supplies should you subsequently discover they're not to your satisfaction.)

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Combination Boilers and booster pumps

You must not attempt to increase performance by adding a pump ahead of the boiler (to increase incoming pressure and flow which is fed directly from the main) or after the boiler to enhance output (this won't work and it is in contravention of Bye Laws being a mains fed device). As the boiler is already working at maximum output there is little point trying to make it work harder.

Furthermore...

Booster pumps are designed to take a 'low pressure' feed and boost it. The pressures that can build up in a mains supply (especially at night when water demand is typically low) can be high and are likely to blow seals. Connecting your pump to a mains supply will invalidate its warranty.

Booster pumps on a gravity water system...

A gravity water system (that's one fed from a header tank) is the ONLY type of water system to which you may fit a booster pump. For various reasons you may not fit a pump to any other sort of system. Installing a booster pump to a gravity supply will normally increase the water pressure substantially, but you should consider what sort of pump to buy carefully based on your shower equipment and more importantly... your expectations.

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Booster pump on a 'split' system (gravity hot, mains cold)

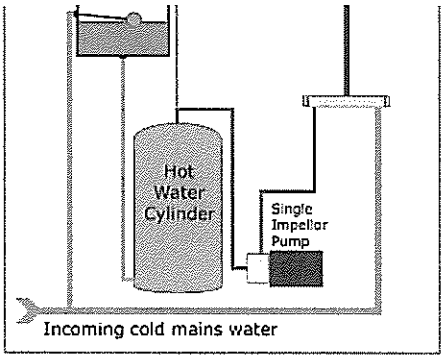
Many households have to deal with what we shall call a 'split system'. This is where hot water is supplied under gravity pressure and all the cold water outlets are at mains pressure. In the old days when a separate tap dealt with each you wouldn't necessarily have noticed. But nowadays it is very common to find mixer showers in many bathrooms and this is where a problem begins to manifest itself.

When you supply a shower mixer valve with unequal pressures you may experience difficulty controlling the output temperature. This can be due to the overwhelming nature of the mains pressure cold supply

be due to the overwhelming nature of the mains pressure cold supply in comparison to the relatively weak supply of gravity hot water.

Water has a single objective - to find the easiest route out. So when the higher pressure cold water hits the shower valve it is presented with a choice - to exit via the valve and handset or go back up the hot water pipe (which can often be the easier option). You can probably appreciate if the latter happens you won't get any hot water.

Attempts are made to cure this problem by simply boosting the pressure of the hot water. Logically one might consider this a sensible option. Although there is nothing wrong with boosting just the gravity supply it frequently fails to address the problem fully. The reason? You need to consider what happens when you open the shower valve. (The diagram to the right illustrates such a setup)



When both feeds (H & C) to the shower valve are pumped gravity supplies the shower pump recognises an initial pressure drop or flow of water as the valve is opened and responds by energising the pump. However, when the cold water is at mains pressure, the moment you open the valve the more boisterous cold supply muscles it's way back along the hot water pipe (seeing this route as an easy way out) and confuses the pump sensor. Being unable to recognise valid start up conditions the pump fails to energise.

It must be said that a twin impellor pump with a gravity hot and cold supply is by far the best solution, but if you have been lumbered with the split system you can get it to work by being a bit tricky yourself.

You need to protect the pump/hot water feed from the initial surge of cold water entering the shower valve. To do this you might try opening the shower flow control while the temperature dial is fully in the 'hot' position. This should prohibit cold water from entering the valve when you initially open it and allow the hot water flow hence activating the pump. Once activated the pump will continue to run as you introduce your cold water to the mix. You should however be very careful! It is essential that you return the shower valve temperature control to a comfortable level immediately after the pump energises. Forgetfulness or failure to do so could result in scalding.

It is stressed this is not a recommended fix, it is a way to cheat the system. It is potentially risky, could result in injury and may not work in all scenarios. It is recommended you do the job properly and install a twin impellor pump. Split or mixed systems are not recommended.

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Power shower pump performance

The ratings by which manufacturers sell their pumps can be confusing. After all, when looking at two different pumps each rated at 1 bar ('bar' is the unit by which pressure is expressed. It is equivalent to 1 atmosphere, 14.5 psi or the pressure that would be generated by a water tower if it were 33 feet in height) what is the difference? Why should one be more expensive than the other?

Bar pressure is only one component of a water delivery system. It is important to take into account another crucial factor when examining pump performance.... the amount of water the pump can deliver (usually expressed in 'litres per minute') at the stated pressure. This is known as the 'flow rate'.

For example: 18 litres per minute (18 l/m or 18 lpm) at 1 bar.

You should not get carried away by the fact that a pump can simply produce high pressure. An example of this might be the little pressure washers you can buy at hardware stores for cleaning patios, cars, windows etc. These are often rated at quite phenomenal pressures (1000-1500 psi or pounds per square inch). Pressure like this could injure you if you were to direct the blast at your skin. Whilst high pressure, these little units actually only shift a very small amount of water. Compare them to the blast from a fire engine hose - at much lower pressure a fire hose can knock a man off his feet. This is because of the volume of water combined with a moderate pressure. The fire engine by maintaining a very high flow rate at a moderate pressure produces impressive force/performance.

This, together with certain other factors, is why one shower pump might cost more than another.

In defence of pump manufacturers, specifying what a pump might be able to do is complicated by another variable - what you are feeding the water through. For example: A pump feeding water down a hose at 2 bar without having a nozzle on the end will surely get your garden wet but you will notice that the water runs rather than blasts out. Now put your finger over the end of the open hose pipe and you'll feel pressure build. At the same time the previously mundane flow becomes a powerful jet that can reach quite some distance.

Without going into this further, it is this principal a shower handset exploits - lots of small holes creating back pressure through which water is forced. Different handsets will have different sized holes, some will have multiple spray patterns. This is why it's so difficult to be exact about how a particular pump will perform - it's all relevant to what you hook it up to.

If you have a 'watering can' or 'deluge' type shower head you cannot expect the same invigorating performance you might get from a handset. Using the above example, you are creating less back pressure because the larger holes in the head are arranged across a wider area and may be more numerous. This configuration will get you very wet but you may not get the powerful force you were hoping for.

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How a power shower booster pump works.

Most shower booster pumps operate by the same principle. Low pressure water is taken into a chamber and fed into the centre of an impellor which is spinning quickly. The water is effectively thrown outward by centrifugal force and ejected from the impellor housing at high speed. The amount of water that the impellor can move determines the flow rate, the force that the impellor can maintain relates to the pressure. A pump typically has one or two impellors, depending on whether it is deemed 'single' or 'twin'. Impellors are driven by a motor (usually electric). A twin impellor pump will often have an impellor located at either end of the electric motor's armature (motor positioned centrally).

The power that the motor can generate will be proportionate to the resulting pressure and flow rate achievable. A twin impellor pump usually takes a hot and cold low pressure feed and boosts them simultaneously. A single impellor pump is suitable for a hot, a cold or a blended low pressure supply. Most shower pumps are set up to sense when you open your shower valve and activate automatically. Similarly, they switch off automatically when you close your shower valve.

Positive and Negative Head pumps

This is a term that you may have come across but misunderstanding still exists to exactly what it all means.

In a nutshell, the difference between the two is determined by whether the header tank is above or below the outlet point. If the header tank is above you have a positive head. If it's below the outlet you have a negative head.

In a gravity water system it goes without saying that water will only travel in the direction of gravity - downward. For this reason some people believe that if you take water down from the loft to a ground floor hot water cylinder, then back up to a first floor bathroom that water is indeed having to go up hill and that a negative head scenario exists. In this example this would be an incorrect conclusion. It is the relative position of the header tank to the outlet point. If the header in the loft is higher than the outlet point then a positive head exists even though the water travelled down to the ground floor before going back up to the outlet.

If indeed the outlet is higher than the header tank and a negative head exists you will require what's known as a *negative head set up.*

In a negative head scenario things kind of happen in reverse. When you open your shower valve (or outlet - which could be a tap) water would rather run backward down the pipe to the header tank. SO... if you want your pump to activate automatically it needs to be equipped with a different type of sensor. Negative head pumps can usually be recognised by a canister that piggybacks the pump. This is part of the sensing system - not needed on positive head pumps. Alternatively, some manufacturers supply (as optional extras) what they call a 'negative head kit' or a 'manual negative head kit'. In reality this kit is nothing more than a manual means of switching on a standard booster pump when water is required at an outlet above the header tank. The negative head kit typically comprises a 'momentary contact' pull chord which energises the pump. Once running the pump will continue pushing water up to the outlet until closed, at which time the pump will turn off - ready for the next manual activation.

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Other things to know about power shower pumps.

Power shower pump rating.

Apart from bar pressure and flow rate there is one other fairly major consideration. Is the pump rated for constant or intermittent use? Some manufacturers dress this up with words like 'regenerative', but at the end of the day it all means the same thing. A pump will either run continuously or it needs to rest after about 10-15 minutes of use (for about 45 minutes to cool down). If you happen to be a household where mum, dad and all the children like to use the same shower one after the other, and the typical shower time will be from 5-10 minutes, then a pump with intermittent rating simply won't suffice. When such a pump has been in operation for it's prescribed time it will simply cut out (so that it may cool down). Many an unwary owner has thought their shower pump to be faulty when in fact it is doing what it needs to do. So, select a pump with a duty cycle that will match in with your requirements.

Size of connections on a shower pump

We mentioned in an earlier paragraph about pressure and flow rate. Focussing on flow rate you should ascertain the size of the pipe connections on your proposed purchase. Shower booster pumps typically have either 15mm or 22mm pipe connections. A 22mm pipe has the capacity to transport twice the amount of water than a 15mm will carry. The size of connection is therefore a bit of a give-away as to the pump's capability. It is not generally considered a good idea to try installing a pump with 22mm connections into a system where the rest of the pipework is 15mm.

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Connecting a shower pump to a hot water cylinder

As mentioned, both the hot and cold feeds to a booster pump need to be gravity pressure supplies. The cold water feed can either be a dedicated cold supply direct from the header tank, or as is often the case, by teeing into the cold water feed to the hot water cylinder. Cold is simple enough. The hot water feed to the pump needs a little more consideration.

The normal hot water draw-off point is typically at the top of a hot water cylinder - right at the top, dead centre. If you simply pull your hot water from this point you may end up with a problem.

The reason: Hot water releases minute air bubbles. Ordinarily these rise to the top of the cylinder and vent out through the header tank in the loft. If you try taking water at the point where the bubbles are leaving the cylinder you are likely to pull them into the pump when it's running. This can cause a condition known as cavitation. In a nutshell, a big bubble of air forms at the low pressure zone ahead of the pump impellor. The condition can cause damage to the pump and will almost certainly generate some weird and wonderful noises - including squealing and banging!

The solutions:

1) If you intend to keep the present hot water cylinder you should consider using either a 'Surrey' or 'Essex' flange. This device screws into the top of the cylinder and creates two outlets. One becomes the normal outlet/vent, the other (being the shower take-off point) draws hot water from slightly lower in the cylinder, hence allowing the bubbles to pass on by.

2) If you intend to change the cylinder for any reason then make sure the new one has a dedicated shower take-off point. This will do the job of a flange type device. Shower take-offs shouldn't make the cylinder any more expensive, but you must ask for one to be fitted as they are not normally included. Click here for more info on cylinders.

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Water Storage - System Capacity.

You might really like the experience associated with a powerful blast of water when taking a shower. Some people don't feel clean unless they feel a layer of skin has been removed during the event! But don't lose sight of how quickly you are emptying your water storage vessels as you shower.

A boosted shower will empty your system quicker. The bigger and more powerful the pump the quicker the system will empty. If you simply add a pump to your existing system you run the risk of potentially running it dry unless you do a few calculations. It is actually quite difficult to be precise with this because of various factors (how much water for example does your shower head deliver?). You will need to make certain guesstimations. The amount of water a shower pump will deliver will even be affected by how big the holes are in the shower head, and how many there are! Some

how you need to calculate how big the header tank in the loft must be in order to provide an average of 10 minutes shower time. Yes, some people (especially teenagers) stand in the shower for longer, so you must either make provision for this or re-educate users. Some people find a timer on the show

it use. Whatever you do and however you choose to do it, make sure you don't run your pump dry - this can cause it irreparable damage.

Shower pump construction.

The materials from which a pump is manufactured will invariably influence the cost of the pump, but with good reason. Cheap shower pumps rely heavily on plastics in their construction. Whilst there is nothing wrong with plastics technology it happens to be a fact that pumps made mainly from plastic don't last as long as their more expensive counterparts. Pumps considered to be 'top end' products tend to be constructed from metal - especially the impellor housings that are often made of brass. It can often be a false economy to buy a cheap pump as the brass-bodied models can outlast them several times over.

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Noisy shower pumps.

A noisy pump can annoy you or drive you to despair! Pumps produce vibrations. This is a fact that cannot be ignored or negated. If you are looking for a vibration-free silent booster pump don't waste your time. Some pumps will vibrate more than others. You can probably guess that cheap pumps utilising cheaper materials and made with less refined manufacturing techniques are likely to vibrate more than their more expensive cousins.

As mentioned, vibration is the culprit. Quality materials and accurately machined components will minimise vibration and therefore noise output but will not get rid of it entirely. It is important to consider the transmission of vibration which is where the noise comes from.

Manufacturers of the more expensive brands of pump recognise this as a major issue. Pumps are therefore made from quality materials such a brass, motors are often of the 'induction type' that run more quietly and the foot upon which the pump stands is designed to absorb vibration - minimising transmission into the surrounding area.

Choosing a site for your shower pump.

Apart from all the operational reasons that will determine the most appropriate location for your pump, there is the issue of vibration. Even the quietest most expensive pumps will vibrate when in operation. It is therefore of paramount importance that you consider well how and where to put your little noise generator.

Place a shower booster pump directly on a timber floor and you might as well stand it on the sound box of a guitar. By it's hollow nature the guitar sound box amplifies small vibrations from the strings so you can hear them (by contrast a solid bodied electric guitar needs an amplifier or it can't be heard). A hollow wooden floor behaves in exactly the same way - amplifying vibrations. Don't do it - the noise could drive you crazy!

Whenever possible you should choose a location and/or stand your pump on materials where transmission of vibration is minimised. A small pad stone, maybe some sort of sandwich including rubber or polystyrene leaves might be considered a suitable way to insulate yourself from vibrations. Experiment but make sure the pump will be secure.

Don't be surprised if having ignored this advice you experience problems.

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One last consideration about locating a shower booster pump

Think in terms of where in your system you intend to install your booster pump. Plan things out before committing yourself to pipework. Never forget that anything connected to the outboard side (the boosted side) of the pump will cause the pump to activate when used. To illustrate this point here follows an example of how you may prefer not to do things...

A typical household decide to up the performance of their gravity fed shower, so install a 3 bar shower booster pump next to the hot water cylinder in the airing cupboard. Having done so, their shower became quite a beast and gave an exhilarating experience to all who used it.

One night the lady of the house was awoken in the small hours by a thunderous noise. She jumped out of bed in a panic to find out what on earth the racket could be. She was surprised to bump into her young daughter who was returning to her bedroom having been to the toilet. "What on earth has happened?" asked the mum. The daughter replied "I don't know, I've just been to the toilet and flushed it." Upon investigation it transpired that the plumber had fitted the twin impellor shower pump in such a position that all water feeds to their bathroom were now boosted. As the daughter flushed the toilet it activated the booster pump. What was worse, the pump had been positioned on the hollow floor in the airing cupboard which, in the dead of night, sounded like a steam train thundering through the house. It was subsequently discovered that not only the shower and toilet been boosted, so too had the bath and the wash basin. So, open a tap and the pump came on!

This story is absolutely true. It highlights the very real considerations of installing a pump and where you should insert it in your plumbing system. If you only wish to boost the shower then make sure that's all that is connected to the output of the pump. (Remember to site it on something quite too!)

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If you find this all a bit daunting and would like to discuss your proposed purchase please feel free to contact any of our friendly staff for advice. We will happily provide any advice you may require.

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