

Are You Pumped Up?

Choosing a pump to handle what's in the water.

When it comes to choosing a pump, with so many factors to consider and a variety of pumps to choose from, it can seem overwhelming to make the right decision. From centrifugal to trash to diaphragm, there are several different types of pumps out there, each suited to match specific needs.

While all will effectively move liquid from one location to another, all pumps are not created equal. Some pumps are designed to move thick, muddy water, while others can only handle clear water. Certain pumps allow sticks, stones, and various trash to flow through, where others would become clogged with such debris.

Choosing an incorrect pump can result in poor performance and damage to the pump's components. Pumps should be selected based on the type of water being moved. But what makes a certain type of water acceptable for one pump but not for another? How does one differentiate slightly dirty water from debris-littered water? To accurately choose the best pump for the job, the user must look below the surface and investigate what is actually in the water.

Centrifugal Pumps. For applications where clean water must be moved, centrifugal pumps offer the best and most inexpensive means to do so. As the name implies, centrifugal force drives the operation of a centrifugal pump by moving water away from the center in a circular motion. An impeller within the pump drives this centrifugal force. With each rotation of the impeller, velocity is increased, which causes the liquid to move into the volute. The velocity is reduced within the

volute and its energy converted to pressure energy. This allows the fluid to be quickly forced from the pump.

Centrifugal pumps have narrow impeller vanes, making clear water that is virtually free of debris the only type of water this pump is able to handle. Obviously there is always a chance that seemingly clear water will contain at least a small amount of debris. This is why these pumps are equipped with a strainer, which acts as a safety net and stops unforeseen debris from entering the intake hose. Draining swimming pools, powering sprinklers, and de-watering job sites are examples of where this pump would do a fine job.

So it's pretty basic what types of liquid a centrifugal pump can handle. But what if the water is even slightly muddy, sandy, or littered with debris? The strainer will help prevent unexpected particles from damaging the pump, but if a user detects any amount of debris in the water, he should be aware that another type of pump exists specifically for this type of situation. For water that may contain debris that could clog or damage a centrifugal pump, a semi-trash pump would be the best option.

Semi-Trash Pumps. In the simplest terms, semi-trash pumps work in the same way as centrifugal pumps, but have thicker impeller vanes and a larger volute discharge opening to allow small debris to flow through. How small? Well, as a general rule of thumb, debris up to 3/4 of an in., or about the size of a dime should pass through without any problems.

A semi-trash pump should be used in any situation where there is uncertainty that a centrifugal pump will be able to

Centrifugal pumps (left) offer a basic, inexpensive way to move water with little to no debris. A cast-iron impeller (center) is one sign of a quality pump. Heavy-duty materials are especially important in pumps that handle debris. A metal strainer (right) will keep oversized debris from entering the intake hose.





A semi-trash pump moves muddy water from a jobsite. Semi-trash and trash pumps' impellers are made with thicker vanes than those in standard centrifugal pumps, which enables them to move larger debris.

handle the job. Water that appears a bit dirty or sandy should be moved using this type of pump. If there is even a hint of debris, err on the side of caution and go with a semi-trash pump.

While a semi-trash pump can handle more than a centrifugal pump, it can still have problems if the debris is too large. It is also incapable of handling sticks, stones, or concrete particles. If a user detects any of those types of debris in the water, he should opt for the next level of pump—a trash pump.

Trash Pumps. For items that are too big for a semi-trash pump to handle, a trash pump would be the best choice. With even thicker vanes than a semi-trash pump and the same large volute discharge opening, a trash pump operates the same way but allows larger debris to flow through.

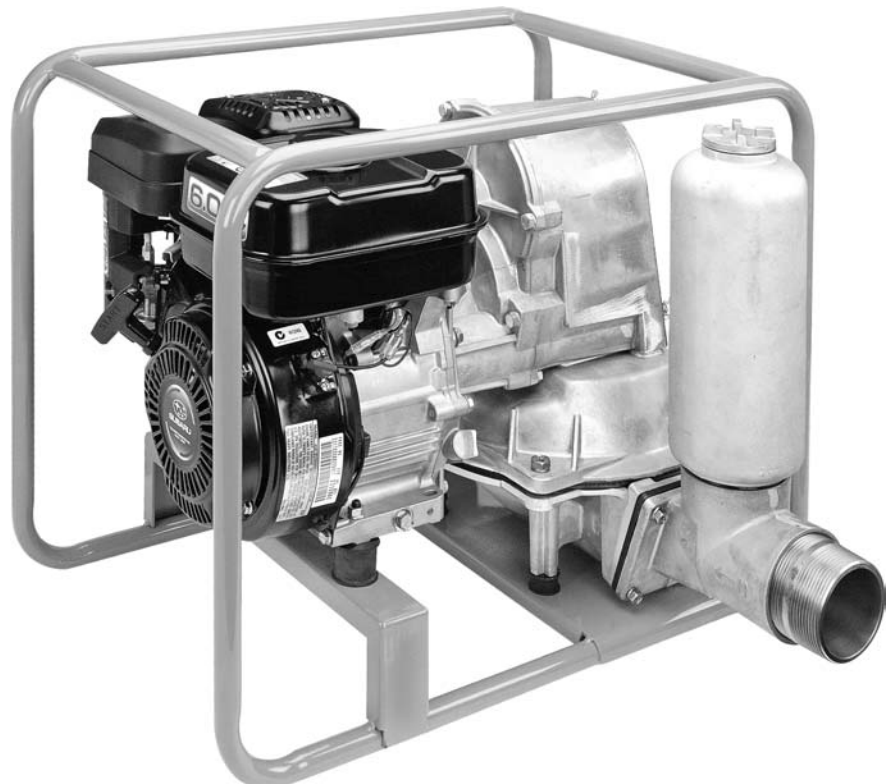
Small sticks, stones, and other debris from 3/4 of an in. to 1 1/4 of an in., or up to the size of

With even thicker vanes than a semi-trash pump and the same large volute discharge opening, a trash pump allows larger debris to flow through. Like a semi-trash pump, a trash pump effectively moves muddy, littered water from a jobsite.

a half dollar coin, can successfully go through a trash pump. This makes it ideal to handle thicker, sandier, and dirtier water than a semi-trash pump.

These pumps are a good choice for situations where high volumes of water that may contain trash need to be moved, especially if there is uncertainty that the debris would be too large to be handled by a semi-trash pump. Pumping water from construction sites is an example of an application that may require a trash pump.

A trash pump can definitely handle thicker water and fairly large debris. But what about really muddy or viscous water that may contain larger solids, trash or other particles? Or





A diaphragm pump will handle any type of debris that can fit through the opening such as sticks, stones, mud, sand, or trash.

water that is so thick, it's almost impossible to detect what kinds of debris may be submerged? For the toughest water with large debris, a diaphragm pump will handle it best.

Diaphragm Pumps. Often referred to as “mud hogs” or “mud pumps,” the diaphragm pump is the one to choose when the water is so thick or dirty that the user cannot detect what may be lurking underneath the surface.

This type of pump operates in a different manner than the others with two chambers moving the water in place of a rotating impeller. As the volume in one chamber increases, pressure in the other chamber decreases, drawing in fluid. When the pressure in the second chamber increases, the fluid is forced out and the process repeats.

Diaphragm pumps can handle sticks, stones, mud, trash, and other debris up to two in., or a bit larger than the size of a golf ball. Basically, anything that can fit through the opening will be able to go through. It will pump seawater, re-circulated water, and muddy, sandy, and viscous water.

All these capabilities mean a higher price tag for this type of pump. For this reason, a diaphragm pump is typically used only when it is the sole machine that can handle the job. And it operates at a slower rate than the others, so be prepared for the job to take a bit longer if using this type of pump. For instance, a three-in. trash pump will move water at a rate of about 315 gpm, compared with a three-in. diaphragm pump, which will only move water at a rate of about 60 to 70 gpm.

By now, the user should be ready to choose a pump based on the type of liquid being moved. But before purchasing, there are a few more factors he needs to think about.

Other Considerations. While the type of water may be the most important influence on the decision, other factors must be considered when choosing a pump. For example, pump sizes are based on how much water per minute the pump will move, and the bigger the pump, the faster it will move the water. So the amount of time the user has to spend pumping will be a big part of the decision. In some cases, a smaller pump would be sufficient to get the job done, but a larger pump may be chosen to get it done faster. And remember,

diaphragm pumps move the largest debris and dirtiest water, but work slower than the other types of pumps.

Furthermore, be sure to compare the quality among pumps. While it may be tempting to save money and skimp on features, having a higher quality pump that withstands time and abuse will pay for itself in the long run. Because the engine is the driving force behind the pump, it is important for it to be high quality and long lasting. Additionally, the pump housing, impeller, and volute are essential to superior operation, so be sure they are well made and not plastic. Some manufacturers equip trash pumps with a wear plate, which absorbs the impact of sticks, stones, and other large debris before they enter the impeller. This is a valuable feature that can ensure a longer life for the pump, while reducing maintenance requirements. Finally, lower quality pumps often don't have frames. Choose a pump with a quality frame to protect the pump, engine, and all components.

Finally, check the maintenance requirements of each pump. Regardless of how high quality the pump is and how well suited it is for the job, a pump that is not properly maintained will likely cause work interruptions and result in the need for expensive repairs. Select a pump that is easy to maintain and requires only minimal professional attention.

With so many pumps available, it can be difficult to know if you are using the correct one. Improper selection may result in unsatisfactory performance of the pump, not to mention possible damage to the machine's components. Having knowledge of each type of pump, and more importantly, what is in the water being pumped, will ensure the best selection is made for the job at hand.

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The preceding is courtesy of Subaru Industrial Products (www.robinamerica.com).



Pumps that frequently handle debris will last longer when they are built with a wear plate, and it is less expensive to get a new wear plate than it is to replace the impeller and volute it protects.