Some dredge basics

If you are in the market for a dredge, or even if you want to build your own, here are a few tips you should consider.

When putting together a dredge, everything is a balance. Typically the heart of a dredge is the motor and pump. For instance, the sluice on a high banker or dredge sluice should be sized to work with the motor and pump package. The hoses and jets should also be sized to match the motor pump and sluice.

We spend a lot of time on the phone helping customers make their homemade equipment work correctly. You would be amazed by the unbalanced machines we here about. There are multitude issues we have to deal with but I would like to touch on the most common ones.

MISMATCHING

One of the most frequent issues is mismatched sluice box size to the actual dredge size.

Example. Trying to run a 3 inch dredge with cheap trash pump and use a 10 inch wide box. I have to explain that the 10 inch wide box is too small and the velocity is too high to catch gold.

Here are a few examples of a well balanced dredge:

2" backpack dredge. Small but effective 2.5 hp 100 GPM pump with 10" wide box.
2.5" dredge 4 hp engine with a 200 GPM pump with a 12' wide sluice box.
3" dredge 5.5 hp with 250 GPM pump 14" wide box
4" dredge 6.5 hp with 275 GPM pump with 16' box
5" dredge 13hp 400 GPM with 20" wide box
6" dredge 13 to 26 hp 20" to 26" wide sluice depending on the pumps and horsepower.

LOW SUCTION POWER

The Pump: The first thing we look at when addressing low suction power is if our customers are using a substandard pump with high volume and low pressure pump. Get rid of the trash or inferior pump. I cannot recommend strongly enough that customers should make the investment on a pump that provides the right balance of both pressure and volume. This is a critical area where you really do get what you pay for.

Level: Keep the sluice box at water level! Even if the sluice box is more than a few inches above the water, this can drastically reduce suction power. We especially find this a common problem with customers are dredging into high bankers. When the high banking height above the water is not much of a problem however when dredging the end of the sluice should be touching the water.

Hoses: High friction loss in the pressure hose will kill your suction power. It is essential to keep all pressure hoses on the larger size to reduce friction loss on your hoses. Also, longer suction hoses require more power. It is critical to keep your suction hoses as short a possible. If you are running a suction nozzle type system the longest, we would ever recommend is about 20 feet. This is due to higher friction loss with a suction nozzle builds up much faster than a power jet system. When using a suction nozzle, the water enters on the suction side of the hose, and you have a much higher volume of water passing through the suction hose.

With a power jet system, we can pull over 100 feet with a larger motor and pump system. The power jet system has the water entering into the jet and discharge end of the hose and creates stronger suction with much less friction in the hose.

Mismatch Nozzle/Jet: It is critical to have the proper jet or suction nozzle design to optimize suction. So many customers attempt to build there own dredge, and they have no concepts of orifices in the jets and the nozzle. The orifice in a jet should be designed to match the performance of the pump. Each pump has a sweet spot a balance of pressure and volume, and the inner opening inside the jet should match the pump. Even if you are building your jet if you are off by even 1/8th of an inch, this can drastically affect the suction power.

Pumps 101

In order to make a dredge work properly, you need a high-performance pump with a good balance of both pressure and volume. So let's get some of the basics out of the way so you can understand the fundamentals on pumps.

Typically, pump manufacturers will rate their pumps in several different ways GPM, GPH, Head Lift and PSI:

GPM Gallons per minute. GPM is important however you need a balance of both pressure and volume.

GPH Gallons per hour. The smaller 12-volt pumps are typically rated in GPH. If you want to calculate gallons per hour, divide gallons per hour by 60. Example. If a pump produces 2200 GPH divide 2200 by 60 = 36 GPM.

Max Head lift: This is the height that the pump can lift water above itself. For example: If you take a P180 pump with a 150 foot head it is possible to attach the 2” hose, and lift water 150 feet straight above the pump.

Max PSI: Pounds per square inch. This pertains to pressure in the pump.

Head lift can be calculated with the PSI.

Take the PSI of the pump and multiply it by 2.31.

For example: If a pump has a PSI of 65, multiply it by 2.3 and that equals a 150 foot head: 65 x 2.3 = 150.

PSI can be calculated with head lift.

Take the head lift number and divide by 2.31.

For example: If a pump has a head lift of 150 this can be divided by 2.31 which equals 65 PSI. 150/2.31=65.

In any dredge, you will have 2 types of suction devices; either a suction nozzle or a power jet. A suction nozzle only works with higher pressure pumps. The recommendation is a minimum of 140-foot head lift for a suction nozzle. A power jet can run at a slightly lower head lift at a 130 foot, however it does require higher volumes.

Direct Mount Pump and Pedestal Pumps

In the world of small dredge pumps there are 2 different types consisting of either a direct mount pump or a pedestal pump.

The direct mount pump is the most popular. It simply bolts directly onto an engine and does not require any couplings or bearings. Direct pumps are lighter, more compact, extremely reliable, and perform better.

Pedestal pumps can be driven with a belt drive or a LoveJoy type of shaft connector. Pedestal pumps may be problematic due to coupler and bearing failures. Pedestal pumps are less efficient due to higher friction loss factors in belts and bearings. The most significant issue is their bulk and weight. This is due to the larger base plates plus all the hardware belts, pulleys, and couplers. The only time a pedestal pump would be used is on the larger 8” dredge, when a diesel engine must be used. It is possible for larger pumps to spin up to 4000 RPM and the diesel engines turn around 1800 RPM. This makes it important to run a speed increase when using these pumps. With our Keene pumps, we place the large pulley on the engine and the small pulley on the pump shaft.

Typical Keene pumps run at about the 150 foot head range, or max out around 65 PSI. Our pumps are built for high performance and consist of a closed face impeller with tight tolerances. These pumps are made from heat treated aluminum alloy for a much

longer life. The impellers are sized to match particular horse power for optimum performance. Housings are designed with a nautilus, or snail like shape for maximum performance. All aspects of these pumps are designed for all-out performance. Keene pumps are lighter, more compact and perform more reliably than any other similar pumps on the market. These pumps are specifically designed to accommodate a pulley between the back plate and the engine. Here at Keene, we put the absolute best customer support behind our pumps and will always have parts in stock so our clients experience little to no down-time.

Below are some examples of working pressures on different dredges which are dependent on sufficient RPMs and horse power.

2" dredge pump specifications.

P90G pump produces up to 100 GPM and up to 160 foot head.

2"suction nozzle works at 45 GPM at 35 psi.

2" power jet runs at 63 GPM at 30 psi

2.5" dredge pump specifications.

PHP160 pump produces up to 200 GPM and up to 160 foot head.

2.5" suction nozzle works at 78 GPM at 45 psi.

2.5" power jet works at 106 GPM at 40 psi.

3"and 4" dredge pump specifications.

P180 pump produces up to 250 GPM and up to 160 foot head.

3"and 4" suction nozzle works at 106 GPM at 45 psi

3" and 4" power jet runs at 180 GPM at 35 psi

Semi-Trash and Trash Pumps

First of all, let me clarify that these terms are actual industry used terms, not my own colorful adjectives. While we understand people want to purchase the most cost effective pumps. With this as their motivation, many will buy a Chinese Semi-trash or Trash pump. Semi-trash pumps are typically used to pump clear or slightly muddy, sandy water. Trash pumps are designed to handle debris and solids such as leaves, and pebbles. However, either pump will only last for a very short time if a large amount of slurry is pumped through them. Performance wise, the Trash pump has an open face impeller, sloppy tolerances and very poor housing design. The pump volume is fair but the maximum PSI is typically very low at 35 PSI or 85 foot head. Customer service and spare parts are sketchy at best and nonexistent at worst. It is impossible to

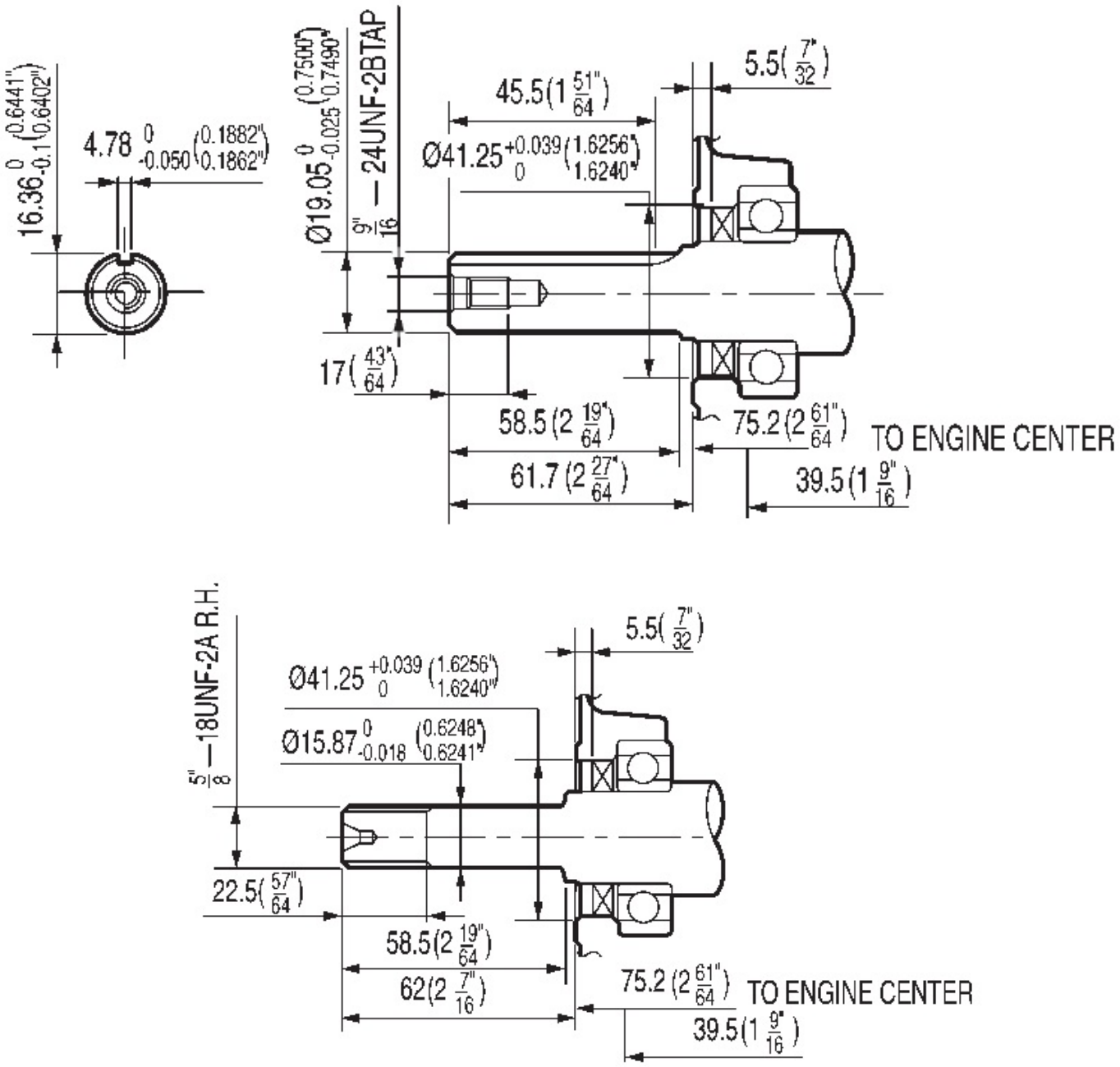
add on a compressor, so do the due diligence before thinking about investing in this type of pump. Penny wise and pound foolish.

Keene Gravel Pumps
This specialized pump is designed to pump sand gravel and rocks over long distances. They can pass large spheres, making them quite different from other pumps. A 4" pump can pass a 3.5" sphere; a 6"pump can pass a 5.5" sphere, and an 8" pump can pass up to a 7" sphere. Gravel pumps have the ability to pump an extremely high percentage of slurry exceeding 30% of material. The concentration of slurry means more material is pumped, and less water. The weight of this pump ranges from 500 to 2000 pounds, and requires 60 to 300 HP. Ideal for dredging lakes, ponds, marinas and other water ways. Gravel pumps such as the 4" can pump up to 50 yards per hour, exceed 1500 foot in distance, and lift material 50 foot above the water.

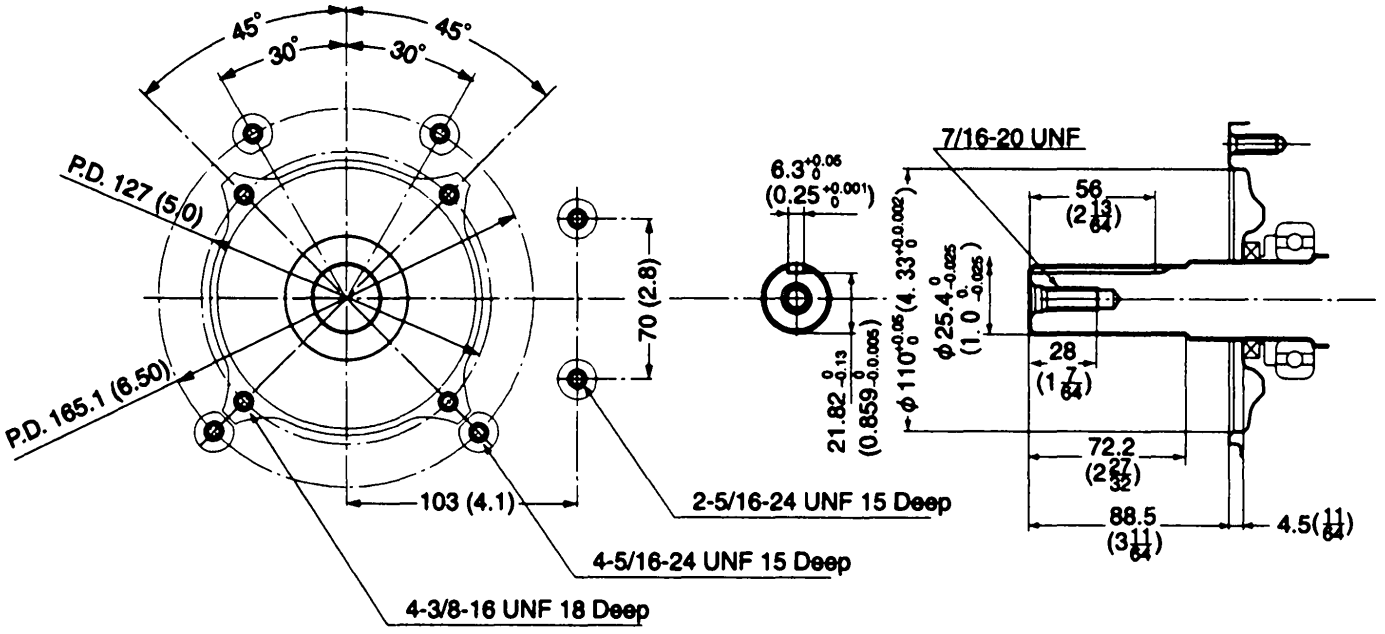
12 Volt Pumps
12 volt pumps have extremely low head lift which are around 5 to 10 feet and under 5 PSI. Therefore, it is very important that the high banker is kept at water level and a spray bar cannot be used. Spray bars will restrict the pump too much, and will reduce the water flow by 80%. We use a flood type header which minimizes any back pressure and provides a smooth even flow of water. In summary, a 12 volt pump will only work with a high banker if the machine is at water level. Large short hoses should be used to reduce friction loss, as well as using a flood header to provide minimum friction loss and optimum water dispersion.

For those wanting to build a dredge a Keene pump is a viable option!
Keene realizes that many people are on a budget and cannot always afford a premium engine like a Honda or a Briggs and Stratton Vanguard. With this in mind the company has come up with a versatile line of pumps that work with a variety of engine and shaft configurations. Regardless of your engine, Keene has a pump to fit your needs.
The line of pumps designed for direct drive include suitability for both Threaded Shafts and Key Way shafts.

We now build pumps that will fit on a 5/8th threaded shaft and a 3/4" keyed shaft for the 3-7 H.P. configurations.



We also make larger pumps that will accommodate a 1” threaded shaft and 1” key way shaft from 8” to 23 Horse power motors. The less expensive engines are sufficient for the miner who does not use their dredge or high banker for more than a few weeks a year. For the miner who works much more than this, we strongly recommend spending the money and investing in a serious engine that is built for years of hard use.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30°
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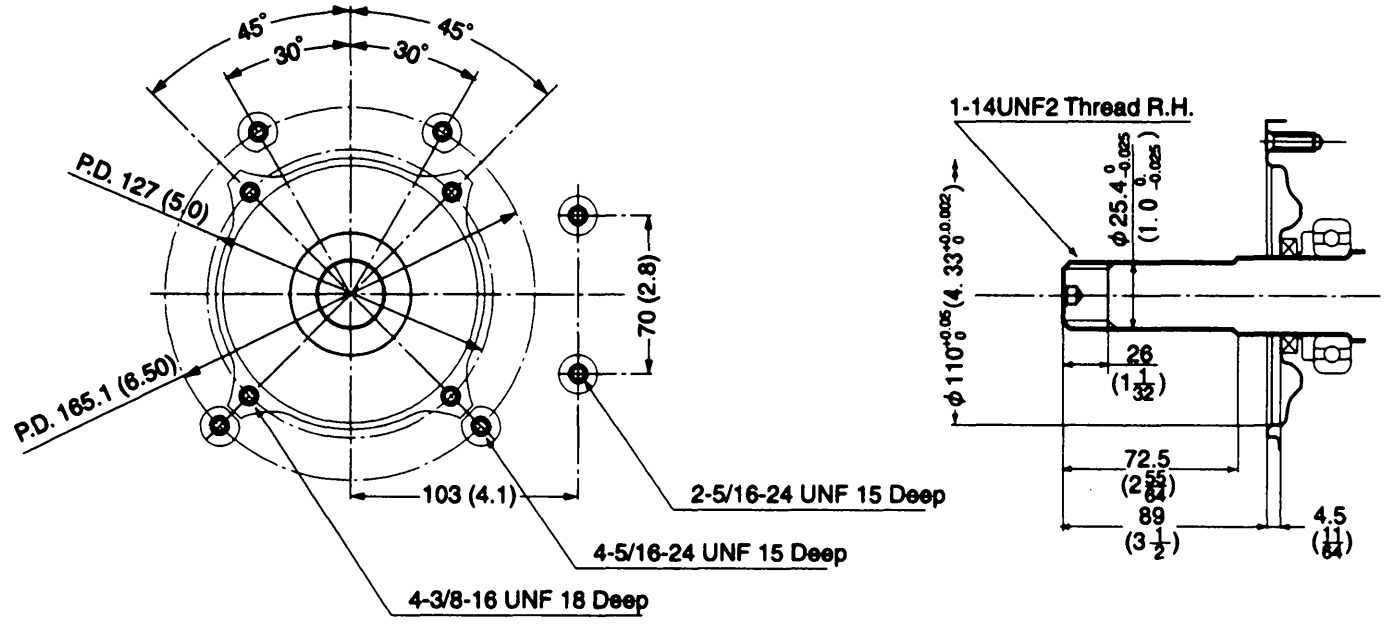
45°
P.D. 127 (5.0)
P.D. 165.1 (6.50)
70 (2.8)
103 (4.1)
2-5/16-24 UNF 15 Deep
4-5/16-24 UNF 15 Deep
4-3/8-16 UNF 18 Deep
7/16-20 UNF
56
28
72.2
88.5
4.5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4-5/16-24 UNF 15 Deep
4-3/8-16 UNF 18 Deep
1-14UNF2 Thread R.H.
26
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89
4.5