

Air

Compressor

Purchasing Guide



Introduction to the Air Compressor Buying Process

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Introduction

Air tools have become a staple on many jobsites due to the simplicity and advantages they provide. In fact, it's estimated that nearly every industry now relies on compressed air tooling to some degree. Among their greatest benefits are that they offer the freedom from electricity and don't require their own motor – especially useful in rural areas or temporary locations like fairgrounds or music festivals. But for these tools to perform in locations that range from urban to rural, they do require the support of an adequate air compressor.

Air compressors power everything from large industrial production machinery to individual ratchet and impact wrenches, paint sprayers, and finish nailers. This broad application is where you often find a couple more major advantages of an air system: versatility and power. Regardless of the scope or location of your project, an air compressor accommodates the full range of compatible tools – switched as quickly and easily as changing a drill bit. Plus, when compared to standard tooling, air powered models often provide greater torque and higher RPMs.

Three types

Air compressors are available in three basic types:

1. **Reciprocating** – Positive displacement compressors that provide increased air pressure by limiting the volume of air. Available in single-stage and two-stage, they're typically capable of outputs ranging from 1 to 15 hp.
2. **Rotary screw** – Positive displacement compressors that are considered simple to operate and maintain. Favored for their ability to provide continuous duty, their design provides cooling within the compressor's interior, saving the individual parts from extreme operating temperatures and enabling them to deliver outputs that range from 7.5 to 100 hp and up.

3. **Centrifugal** – Compressors that do not rely on positive displacement and are most effective when running at their full capacity, making them ideal for operating environments in which demand is continuous and output needs start around 100 hp.

In general, air compressors are highly durable tools. For example, it's estimated that a rotary compressor will last for 40,000 to 60,000 hours – the equivalent of full-time operation for 20 to 30 years. With regular maintenance, reciprocating compressors have a life expectancy of 10 to 15 years. Each of the three types also has a number of advantages and disadvantages we'll cover in more detail below.

Importance of a professional dealer

You'll quickly discover that air compressor dealers often specialize in a particular brand. The reason is manufacturers typically require exclusivity among their networks. While this entails a little more comparison shopping on your part, it ends up being a plus in the long-run. Specialization enables the dealers to become highly familiar with each of the models they're selling, the specific applications they've been designed for, and the type of service required to keep them up and running.

This expertise allows them to consult on the exact type of machinery best suited to your intended application(s) and also offer value-based service packages at a fixed cost that can help you maintain the investment well into the future. In fact, by some estimates, maintenance and repair can account for as much as 20% of the total investment on a light-duty or industrial air compressor.

Estimated costs

The more power you need, the more you can expect to pay. But given the versatility of an air compressor, a single investment may end up saving you on the purchase of additional tooling and equipment.

Here are some estimated costs on popular specs:

Type	Horsepower	CFM	PSI	Portable / Stationary Mounted	Estimated Cost
Reciprocating	3 - 5 hp	10.3 - 15.5 cfm	135 psi	Portable	\$800 - \$1,400
Reciprocating	7.5 hp	24 cfm	175 psi	Portable	\$1,900 - \$2,200
Rotary Screw	10 hp	34 cfm	175 psi	Portable	\$2,700 - \$5,200
Rotary Screw	15 hp	46 cfm	175 psi	Portable	\$2,900 - \$7,500
Rotary Screw	80 hp	185 cfm	80 - 125 psi	Stationary	\$12,000 - \$17,500

Centrifugal	20 - 200hp	14.3 - 998 cfm	75 - 150 psi	Stationary	\$17,000 - \$24,000
Centrifugal	250 - 500hp	1466 - 2444 cfm	109 - 125 psi	Stationary	\$35,000 - \$90,000

Trends

Your specific application and the horsepower required to achieve it effectively will largely determine the air compressor you purchase. But there are a number of trends that may also factor into your purchase decision. The incorporation of one or more of the following has the potential to significantly increase the productivity and cost-effectiveness of your process.

Which of the following could apply to you?

Variable speed drive

This development uses variable speed technology and a special drive to control the speed of the unit, saving substantial energy – up to 35% less with some models – when compared to a fixed speed air compressor. With this vast potential for savings, some dealers cite variable speed drives as “superior to all other control technologies” on the market today.

In short, a variable speed drive automatically pairs its output to the user’s demand for air. The continuous, real-time nature of this development is what provides its peerless energy efficiency, reducing demands for power and fuel while also cutting emissions. Further cost and energy savings are found in its ability to provide unlimited motor starts, progressing from zero to full load without spikes in electric current or generating surplus heat.

Tier 4 engines

The Tier 4 category is known for its adherence to EPA guidelines regarding emissions control. But Tier 4 engines – often manufactured by leading brands like Caterpillar and John Deere – also provide fuel efficiencies that can save you on the total cost of ownership for a diesel-based air compressor.

Many of the top air compressors that incorporate Tier 4 engines are easily capable of 300 to 425 cfm at 100 to 200 psig. They feature advanced electronic control systems that include easy-to-read gauges and an LCD display, allowing the user to quickly adjust specific factors to achieve the optimum combination of performance and cost-effectiveness.

Though not standard to all, some models further extend their value through design enhancements. These can include a frame engineered for full fluid containment as well as easy access service doors that simplify service and maintenance for the fuel tank, engine, air filters, and other vital compartments.

Greater capacity, lower power requirements

The goal of almost every technology is to produce more with less. Air compressor manufacturers have pursued this goal by delivering ever higher levels of output on less fuel. One way they do it is through lower operating temperatures. By redesigning their compressors with lower internal temperatures, new models provide noticeable improvements in volumetric and electrical efficiencies.

Another aspect is seen in a trend we covered above: variable speed drive. Consider for example a rotary screw air compressor. Often integrated into woodworking and spray painting operations, auto body service and repair shops, and even larger industrial operations, they are often not a continuous use machine that has to operate at full capacity. In these situations, a variable speed drive is able to compensate for shifting power demands and monetize them – saving fuel, not to mention unnecessary wear and tear on machine parts. As mentioned above, this technology can reduce energy costs by more than a third, with some variable speed compressors even capable of operating on 40% less energy than their standard counterparts.

Oil-free rotary screw compressors

Essentially maintenance-free, oil-free or “oil-less” air compressors are permanently lubricated through a long-lasting treatment of Teflon or a similar synthetic resin. While oil free models aren’t ideal for continuous use applications, they’re great for short duty and home use. They’re also becoming one of the preferred types for spray painting outfits and other operations that require clean work environments. The reason is that oil-lubricated compressors discharge a small amount of oil in the form of mist, a design limitation that makes the mess difficult for some applications.

In addition to maintenance costs that are practically non-existent, oil-free compressors also tend to be less expensive due to a design that requires fewer parts. This minimalist design also makes them lighter, great for those needing portability.

Types

As mentioned briefly in the introduction, air compressors are divided into three main types:

1. Reciprocating compressors
2. Rotary screw compressors
3. Centrifugal compressors

Within these three types, there are two different varieties. The more common of the two, encompassing two of the three types, operates through the use of positive displacement.

Positive displacement is a mechanical design that generates air pressure through a pump that’s split into two sides, suction and discharge. These two sides or cavities expand and decrease as air is pulled into the suction compartment and released on the discharge side during the

compression stroke. Positive displacement is common among reciprocating and rotary screw air compressors because of its suitability to compressing small amounts of air into high pressures, as well as its ability to quickly disperse the heat resulting from compression.

With that in mind, the air compressor you select will be determined by a number of specific factors including power output requirements and portability.

Here's how the three types compare.

Reciprocating air compressors

Reciprocating compressors are positive displacement models. The same volume of air that enters the compression chamber leaves the cylinder, pressurized to the necessary PSI. Usually falling on the smaller end of the output scale, reciprocating models feature one of two different cylinders:

- **Lubricated** – An abbreviated term for “oil-lubricated compressors,” lubricated models use oil to maintain the integrity of the cylinders, piston, and piston rings. The upside to this design is that it usually requires little maintenance aside from having to periodically service the filtration system.
- **Non-lubricated** – Using Teflon piston rings in place of oil, this variety requires no lubrication and is often lighter in weight due to the use of aluminum components in place of cast iron. Similar to the service requirements for lubricated models, the Teflon rings have to be continuously replaced.

Positive displacement aids in the dispersal of heat, often leveraging water-encased cylinders to avoid buildup. Reciprocating compressors also incorporate intercoolers between each stage as well as after-coolers that act as a final filter on heat and moisture before discharging the pressurized air. In terms of capacity, these are the short duty models of the group, capable of a max of 50 hp and 12,000 CFM at 125 psig.

Rotary screw air compressors

The second type of positive displacement compressor, rotary screw air compressors are built with two or more interlocking screws that draw the air into the system. As the outside air is pulled through the system, it's compressed at increasing degrees and discharged at the desired psi. Similar to the reciprocating variety, rotary screw models are also split into two unique types:

- **Flooded** – Flooded compressors pair oil with the air being pressurized as it moves through the system and then filters it out before discharge, recycling it back to the sump for continued use. Regular maintenance for this type of compressor includes routine changes for oil, filters, and separator.
- **Oil-free** – This type is exactly similar to its flooded counterpart with one major exception: oil is replaced with non-contacting carbon ring seals that eliminate the possibility of oil entering the air stream within the compression compartment. The one

disadvantage to this type is that it tends to suffer from excessive heat build-up as it does not have the capability of inlet throttling, a feature that often makes the flooded version preferred.

Rotary screw air compressors have a far greater capacity than reciprocating models, offering anywhere from 7.5 to 100 hp with displacements of up to 2,500 CFM at 125 psig.

Centrifugal air compressors

The odd one out, centrifugal compressors are the largest of the three and powered by electric motors or steam turbines to produce outputs up to 500 hp and 15,000 CFM at 125 psig. Used primarily within large industrial manufacturing processes, this massive amount of pressure is generated through staged compressions, often requiring 2 to 5 stages.

Unlike the positive displacement type, centrifugal models contain at least two impeller assemblies that rotate to compress incoming air. This rotation causes velocity, creating energy that's used to pressurize the air. The upside to this design is that its capacity is highly customizable, easily regulated by adjusting air inlet or outlet as well as the speed of velocity.

Centrifugal compressors are substantially more costly than the other two models. And the upfront cost is only the beginning. They require constant maintenance and often need costly repairs on individual parts resulting from high velocities and continuous use practices.

Other options

While all air compressors are represented by one of the three types mentioned above, they are also available in different designs to suit needs related to portability, size, and weight. Among the most common designs are:

- **Portable** – Designed for easy transport from one job to the next, portable air compressors are lightweight and often come mounted on carriages containing 2 to 4 wheels. The obvious advantage is the ability to take it anywhere, powering air tools in an endless range of work environments without needing extra long air hoses to stretch from a stationary location or truck mounted compressor. This type usually falls within the reciprocating family and therefore produces less power overall when compared to larger models.
- **Stationary** – Designed for long-term projects, stationary air compressors provide substantially more CFMs than their portable cousins. They also require special



installation considerations that often include extra hosing drilled through walls and mounted above work areas. Higher end rotary screw compressors are commonly among this variety.

- **Truck mounted** – Truck mounted compressors are similar to stationary models except they can easily be taken from one jobsite to another without disassembly and reassembly. Plus, larger models are capable of powering multiple air tools at once. Somewhat more environmentally-friendly, electric options are common among mounted compressors, enabling you to save on the cost of fuel during continuous use. But, like a stationary model, you'll have to run hoses from the truck to the work area and account for a loss of air pressure that can range between .7 to 25 CFM depending on the length of the run.
- **Towable** – Often found on construction jobsites or within forestry applications, towable air compressors are mounted atop trailers featuring heavy duty steel chassis and fully galvanized canopies. Often featuring a simple connection like a lifting eye hitch, they can be hitched onto any large work vehicle and provide outputs from 14 to 327 hp and 50 to 1,200 CFM (at 125 psig).

Specs

There are a few key areas that can be used to compare both the value and usability of an air compressor. So when comparing different models, here's what you should be on the lookout for.

Stages

The term "stages" is used to describe the cylinders in an air compressor. You have two options: single stage and multistage.

Single stage compressors are built with only one cylinder that compresses the air, often capping out around 120 psi. This is usually adequate for home use or smaller shops that only power one tool at a time. If you're looking for portability (and an air compressor that can easily be carted and lifted), single stage is the way to go.

Multistage compressors are designed for multiple pneumatic air tools and those that require more than 120 psi. With more than one cylinder, the air is first compressed in the initial cylinder and then compressed in each successive cylinder to achieve higher levels of power. Due to the additional mechanical processes involved, multistage compressors generate more heat and require a cooling component, often in the form of a radiator.

Power

This may be decided for you if you plan on using the compressor in an enclosed area – which immediately disqualifies gas and diesel-powered compressors due to the exhaust they produce. Output also often determines the power source, with diesel engines capable of greater horsepower than electric models.

In general, you'll have a choice between these three options:

- **Gas** – Often portable, gas-powered compressors are a strong alternative in rural areas and jobsites that aren't connected to the power grid. Unfortunately, they can weigh in excess of 200 pounds in some cases. You'll find two different types: those with an electric generator that powers a cylinder and those that power the cylinder directly. The downside to this setup is they tend to generate more noise than other models and also require the storage and transport of additional fuel. But if you need a multi-stage compressor, this will probably be one of your only options.
- **Diesel** – Diesel models usually provide the highest levels of output, commonly ranging from 185 to 1,600 CFM – far and above that of gasoline or electric compressors. This is why diesel is often the power source behind truck mounted and towable models, enabling them to provide higher torque and greater capacity for a wide range of air tools connected simultaneously. Similar to their smaller gasoline counterparts, you are required to keep extra fuel on hand. But diesel models are often engineered with smaller tanks that allow them to be mounted efficiently on a variety of work vehicles.
- **Electric** – Reportedly one of the most common types of air compressor, as they're typically lighter and more compact, electric models are environmentally friendly and can be used safely in enclosed spaces. Most are powered simply by plugging them into a standard wall socket, though larger models that produce higher CFMs may require access to higher voltage. It's worth noting that this type of compressor requires longer air hoses as some experts discourage the use of extension cords with air compressors.

Purchasing tip: Make a list of every air tool that will require power simultaneously and plan ahead. Under-buying will quickly burn out your compressor, regardless of its power source. And over-buying can be just as bad. You'll be paying unnecessarily for surplus gas, diesel, or electricity.

CFM, PSI, and horsepower

CFM or cubic-foot-per-minute is the measurement of delivery with respect to inlet. In short, it gauges flow, not volume. PSI or pounds-per-square-inch is the pressure that results from one pound-force directed at an area of one square inch. This results in a measurement of resistance to flow.

Mathematics aside, when evaluating air compressors you'll need to be aware of both the CFM and PSI – but one more than the other. Many air tools operate at 90 psi, with compressors providing anywhere from 75 to 175 psi as a result.

CFM is more important. In fact, some experts cite it as one of the most important purchase considerations when buying an air compressor. If you plan on powering more than one tool or pneumatic device off of a single compressor, you'll have to add up the CFMs for each to ensure you have enough output to power them all. You'll also want to consider exceeding the total by anywhere from 25% to 40% to allow for a buffer and prevent overworking the compressor.

CFM requirements are usually listed on the packaging and can also be found on the manufacturer's website.

Finally, horsepower. According to a leading air compressor manufacturer, horsepower is important... but not nearly as important as CFM when comparing different compressors. Larger air compressors often boast higher horsepower and lower CFMs. Unfortunately, these models tend to run hotter and give out sooner than others. So when purchasing a new or used air compressor, pay attention to the CFM rating first and all else second.

As a general reference, here are some popular tools and their average CFM requirements:

Pneumatic Air Tool	CFM @ 90 PSI	Pneumatic Air Tool	CFM @ 90 PSI
Angle Disc Grinder (7")	6 CFM	Grease/Caulking Gun	4 CFM
Air Drill (1/2" or 3/8")	4 CFM	Hydraulic Riveter	4 CFM
Brad Nailer	.3 CFM	Impact Wrench (1/2" or 3/4")	2.5 - 7 CFM
Chisel/Air Hammer	3 - 11 CFM	Nailer	1 CFM
Drill	3 - 6 CFM	Ratchet (1/4" or 3/8")	3 - 6 CFM
Dual Sander	6 - 11 CFM	Spray Gun	6 - 18 CFM

Choosing a Quality Seller

As mentioned briefly in the introduction, a professional seller is an enormous benefit when it comes to the selection process and post-sale support. Specializing in the specific brand and application you're interested in, a professional air compressor seller provides additional resources and information that can include the following.

Safety resources and laws

Though compliance isn't mandatory for air compressor operators, OSHA published a checklist of safety suggestions for air compressors. Largely addressing issues related to service and maintenance, a qualified seller can address each of these concerns and will often build them into a service level agreement that routinely inspects each component for wear.

Warranties and service level agreements

Many quality air compressors are backed by a full warranty. But the specifics of those warranties often vary from company to company. Others offer a selection of warranties that cover popular parts for a set term: 3-year, 5-year, 7-year, and 10-year are common examples. Items covered typically address issues related to:

- Airends
- Variable speed drives

- Drive motors
- Rings
- Gaskets
- Suction/discharge valves
- Air/fluid receivers
- Drive couplers
- Coolers

Service level agreements (also known as “SLAs”) are above and beyond the warranty. They outline a routine service plan designed around preventative maintenance. Offered for an annual fee (or sometimes on a monthly basis), common items included in this type of post-sale support include:

- Oil levels
- Belt tension
- Coolers
- Electrical connections
- Air filters
- Valves
- Traps

Strength of manufacturer

Most air compressors are produced by companies with long-established histories – Ingersoll Rand, Campbell Hausfeld, Hitachi, Husky, Maxair, Sullair, and Kaeser to name just a few. These brands have extensive dealer networks through the United States and around the world.

Nevertheless, check into the dealer in your local area. Is it a new business or have they been around for awhile? A seller that's been offering the same air compressors for 10 or 15 years obviously knows what they're doing and has an established track record of quality service. This also indicates they will more than likely be around for the foreseeable future to provide the support necessary for your compressor.

Questions to ask

Whether you're buying a new or used air compressor, here are a few questions to ask the seller to ensure you get the right machine for your intended use:

- How long have you been in business?
- What industries do you specialize in? And how many air compressors have you sold like the one I'm interested in?
- With my application in mind, what are some of the common problems other buyers have encountered with this compressor? What was the solution?
- What type of warranty covers this air compressor?
- What are your service hours? And how quick is your average response time?

Free purchase comparison

Tracking down qualified sellers isn't easy – unless you have us on your side! Take a moment to fill out the quote request form you'll find here and we'll connect you with a variety of established air compressor sellers in your local area – for free!

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