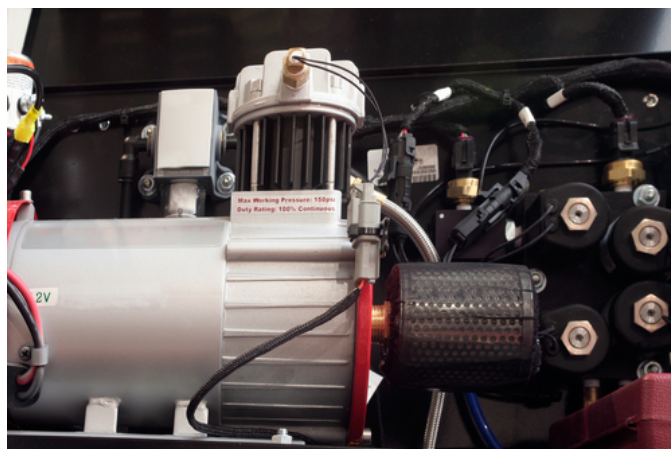


Air Compressors Buyer's Guide

By the purchasing experts at BuyerZone

Compressed air is used in almost every industry you can name: automotive, construction, universities, hospitals, mining, agriculture, food and beverage, consumer goods, pharmaceutical, electronics, and more. It's so flexible and useful that industry contacts sometimes refer to it as the "fourth utility."

This **BuyerZone Air Compressors Buyer's Guide** will help you understand how to make a successful air compressor purchase. Click a topic below to jump to that section.



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To start, here's a quick look at how much you can expect to pay for a new air compressor.

Size	Reciprocating	Rotary
< 1 HP (home use)	\$500	na
5 HP	\$1,500 - \$2,000	\$2,500 - \$4,000
10 HP	\$4,000 - \$6,000	\$4,000 - \$6,000
25 HP	\$10,000 +	\$7,000 - \$9,000
50 HP	na	\$12,000 - \$15,000
100 HP	na	\$22,000 - \$28,000
200 HP	na	\$45,000

Compressed air introduction

There are three main classes of compressed air applications:

On the smallest scale, compressed air can run a huge range of **hand tools**, such as grinders, drills, and nail guns. Using air power makes the tools lighter and cooler, since they don't need internal motors.

In **manufacturing**, compressed air is ubiquitous as a source of power: to gently move products from one location to another, drive powerful punches or stampers, or power modern robotic tools.

Finally, some applications make more **direct use** of the air. Compressed air is essential in sandblasting and spray painting. It's commonly used for cleaning – from blowing metal shavings off a lathe to making sure semiconductors are dust-free. And of course there are straightforward applications like inflating tires and filling scuba tanks.

Regardless of the application, the machine that makes it possible is an air compressor. If you're in the market for an air compressor, this Buyer's Guide will help you make the right choice. We'll help you understand the major types of compressors, learn how to choose the right size compressor, and get the best compressor for your business.

Basic types of air compressors

For most industrial and manufacturing uses, there are two main types of air compressors to consider:

- **Reciprocating compressors** – In these machines, also known as piston-driven compressors, pistons compress the air in a cylinder and force it into a high-pressure storage tank. Piston-driven machines are the oldest and most affordable type of air compressor, and are most commonly found in portable applications or home workshops.
- **Rotary compressors** – Instead of using pistons, rotary compressors use twin screws, like two oversized drill bits next to each other, to force air up into higher pressures. Until recently, rotary machines were considerably more expensive than reciprocating models – now, prices are becoming more and more competitive.

Both types are available in two-stage models that compress the air a second time to allow for increased pressure and air flow.

An important way to decide between these two is to consider whether your application is continuous use or intermittent. A nail gun, firing a burst of air every few seconds, is an intermittent tool, while a spray painter is used continuously. If your application calls for **continuous use**, you'll want a rotary compressor.

That's due to the rated "duty cycle:" the amount of time each hour that a compressor is able to work. A duty cycle of 75% means the air compressor needs to rest for 15 minutes out of every hour to cool down. Rotary compressors have a duty cycle of 100%, thanks to fewer moving parts and robust oil cooling systems. In contrast, reciprocating compressors are designed to run only part of the time.

Centrifugal compressors

A third major type is the centrifugal compressor. These high-end compressors are essentially turbine engines: they use rotating blades to create high pressure. They are almost exclusively used in power plants and huge industrial applications, simply because they begin to become economically competitive at a scale well beyond that of most users.

Air quality and other considerations

There is a considerable difference between the “fourth utility” and the traditional utilities of gas, water, and electricity: a business has complete control over the production and quality of its compressed air. Depending on your needs, you may want to take steps to improve the overall quality of your air, especially if your compressor is going to power manufacturing automation equipment or other expensive machinery.

Because of the temperature changes involved its creation, compressed air can suffer from condensation that introduces moisture into the air delivery. In sensitive equipment such as CNC routers, any water is likely to cause problems and may void your warranties. To combat this, compressors can be equipped with **driers** that remove all traces of moisture.

Air from a compressor is also usually warmer than environmental air. If that's not appropriate for your task, you can get **coolers** to lower the air temperature.

Compressed air can also accumulate small particles of oil, dust, and other debris. Relatively inexpensive **filters** can remove these particles and protect your equipment.

A small investment in conditioning the air that comes from your compressor can protect a much larger investment: cool, dry, clean air can extend the life of your manufacturing equipment.

Oil-free air

Because the oil required to lubricate compressor motors can sometimes get into the air supply, basic air-powered tools are generally tolerant of some oil in the compressed air. However, for applications such as working with food or semiconductors, as little as one part per billion of oil is unacceptable. In these cases, you'll need **oil-free** (or **oilless**) air.

While driers, coolers, and filters are add-ons that can work with any air compressor, oil-free compressors are a separate class entirely. Oil-free air compressors have compression chambers that are completely sealed off from the oil-lubricated parts of the machine, ensuring a steady flow of completely oil-free air. They're considerably more expensive, so you should only choose one in the most sensitive situations.

Heat and noise

You should also consider the placement of your compressor. Compressors generate considerable amounts of heat: in addition to the heat of the motor, the physics of compression are such that increasing pressure on a gas while reducing its volume also increases temperature. Compressors

can also be very noisy – more than 100 decibels, in some cases. These two factors lead many businesses to set up a “compressor room” where the heat can be vented and the noise contained, while air is distributed to where’s it needed through long hoses or piping.

If you don't have the luxury of space, you may want to get an enclosure for the compressor to reduce noise levels. Alternatively, you can make sure to choose a quieter type of compressor. Rotary compressors are much quieter than reciprocating models: new rotary machines are not much louder than 65 db, the same volume as typical conversation.

Power

Compressors are usually powered by electricity. The smallest models run on standard 110v, single-phase power, but most commercial and industrial models need three-phase power. Often, you'll be able to specify the voltage (208v, 230v, 460v) the compressor should run on, so make sure you know what you have available.

If you're going to use your compressor outdoors, or move it around quite a bit, you'll instead want to choose a compressor with a gasoline or diesel engine. Internal combustion engines will greatly increase the noise and heat your compressor generates, but they are usually cheaper to operate than electric compressors.

Mobility

If your compressor is going to be mobile, you'll also want to pay more attention to the weight, wheels, and handles on the compressor. Larger engine-driven compressors for construction are often self-contained trailers, making it easy to move them from job site to job site. If you won't be moving it around but do have concerns about space, look for a compressor that's vertically oriented. It will leave you with more valuable floor space.

Sizing your air compressor

Knowing your application is the first step towards choosing the right air compressor. Most tools and machines powered by compressed air will give you two important pieces of information: the required **air pressure** and **air flow**. The air pressure will usually be measured in PSI – pounds per square inch. Air flow is typically measured in CFM – cubic feet per minute. Each piece of equipment will have requirements for both: “3 CFM at 90 PSI,” for example. You can run multiple tools off of one compressor, too, so gather this information for every piece of equipment that will be run off the compressor.

If your equipment is old or lacking documentation, you might not be able to get these exact figures. At least take down the make and model information – your compressed air dealer will probably be able to make an educated guess based on the type of equipment.

Once you've gathered the requirements for each tool, add up the CFM figures for all the tools that will be used simultaneously – that's the absolute minimum CFM to look for. The rule of thumb is to multiply that number by 1.5. This will give you a good margin of error in case some tools leak small amounts of air and keep you from overworking your compressor.

Next, take the single highest PSI requirement from any tool, and bump that up slightly as well. If your tools require 90 PSI, buying an air compressor that provides the CFM you need at 100 PSI will make sure you always have enough pressure to run your equipment. Don't overdo it, though: running a compressor at 120 or 150 PSI when you only need 90 is a waste of electricity.

Once you have both these figures, choose an air compressor that can meet the CFM **and** PSI requirements at the same time. Some dealers will list CFM ratings at 45 PSI, then tell you that the same compressor is capable of 90 PSI. It may be – but it might not be able to provide the same air flow at that pressure. Don't hesitate to describe exactly what tools you'll be running and ask the dealer point-blank if the compressor is adequate for the job – then compare his answers to the written specs.

You may see some compressors rated in ACFM (actual cubic feet per minute) or ICFM (inlet cubic feet per minute) – they're essentially the same measurements as CFM.

Compressor types and typical ratings

Knowing your requirements can help you decide which type of compressor is best for you. The largest two-stage reciprocating compressors max out at around 100 CFM, but in practice it's uncommon to see them over 50 CFM. Rotary compressors can reach 1500 CFM with a single stage and 2500 or more with two.

At the low end of the market, smaller air compressors – below 5 HP – are almost exclusively piston-driven. And centrifugal compressors operate upwards of 1000 CFM and in a range of 400 to 8000 HP. At that size, centrifugal air compressors provide air at competitive costs.

Note that compressors are most commonly rated by horsepower instead of CFM or PSI. A small home air compressor might produce 1.5 HP while large industrial compressors reach into the hundreds or even thousands of HP. The rule of thumb you can use to determine your approximate needs is that 1 HP should produce 4 to 5 CFM.

Don't worry too much about horsepower when you're shopping: more efficient compressors can produce better CFM with less horsepower, and manufacturers have different methods of rating HP. Instead, stick with the CFM and PSI specifications.

Plan for expansion

When evaluating your compressed air needs, be sure to consider your plans for the future. Air compressors can easily last 10 or 15 years, and while planning that far ahead is difficult, you should at least be able to plan for the next year or two: will you be adding more tools? Or more employees who'll be using the air simultaneously?

In addition, many businesses that introduce compressed air into their operations find additional applications that they didn't anticipate: using it to clean up, for example. While these applications may be less central to your business, they do increase demands on your compressor. Buying a compressor with enough capacity to handle your plans for growth is definitely the savvy business purchase.

Compressors and energy costs

Operating costs for an air compressor can be surprisingly high. Estimates differ, but industry experts say that over a five or ten year span, you can expect the cost of the machine and all maintenance to make up only 10% to 30% of the total cost of ownership. The other 70% to 90% is purely the energy cost to run it.

For example, start with a typical electricity cost of eight cents per kWh. At that rate, a 15 hp compressor running eight hours per day, six days a week, will use \$2,000 to \$3,000 in electricity annually. A 100 hp compressor in a two-shift operation can consume \$35,000 in electricity in a year – much more than the initial cost of the compressor itself.

The smart business shopper will recognize that saving 20% or 30% on the initial purchase cost is insignificant compared to the overall costs. Get the most efficient compressor you can, even if you pay a premium to get it by comparing the **CAGI data sheet** for each model you're considering.

The Compressed Air and Gas Institute (CAGI) is a non-profit industry association that has developed standards for testing and reporting statistics on air compressors, including flow, pressure, horsepower – and expected energy consumption. The data sheets are similar to the yellow energy efficiency stickers you see on appliances: the net result is that you'll be comparing apples to apples.

Any dealer should be able to provide the CAGI data sheet for the compressor you're considering. Also, some manufacturers make them available on their web sites. Be sure to include this step in your evaluation.

Choosing a dealer

Air compressor dealers usually specialize in one brand – often, manufacturers require exclusivity from their dealers. The result is, you'll have to talk to a few different dealers to evaluate multiple brands. On the other hand, because the dealers are forced to specialize, they develop a good understanding of the manufacturer's wide range of offerings and can usually do a very good job of supplying you with the right compressor for your needs.

In your research, be careful not to get overwhelmed with specifications and product claims. When buyers feel like they have too much information, they often wind up basing their purchase decision only on price, which is never a good idea. Take the time to talk to each dealer and understand which compressor is right for you – you'll be far happier in the long run with the right compressor than you will be with saving \$500.

Here are few characteristics to consider when comparing dealers:

- **Longevity.** How long has the dealer been in business? A dealer that's been selling air compressors for 15 or 20 years is obviously doing something right, and is more likely to be around in the future to support your purchase than one that is just entering the market.
- **Dedication to compressors.** Some dealers choose to offer a few air compressors simply as a convenience to their customers, even if the bulk of their business is in tools or supplies. If air compressors are the dealer's main business, they're likely to have a better understanding of the systems.

- **Strength of manufacturer.** Most compressor manufacturers are well-established companies, but you should still check their commitment to the business. Some heavy equipment makers might make a small handful of compressors but not really focus on them – stick with those that sell a full line of air compressors.
- **Staffing.** Does the dealer have enough support and maintenance staff to protect and service your investment? Are they well-trained and experienced?
- **Service rates.** How much will you have to pay for repairs? Will they sell you a maintenance contract if you want one, or just sell you parts and let you do the work yourself if you prefer?

We also recommend that you ask potential dealers for references. Of course they'll supply you with references who are happy with them overall, but by asking the right questions, you can get some good information. Ask about how often their compressor needs repairs and how prompt the dealer is to make them. Find out if they've purchased additional compressors, and if they bought them from the same source. And ask leading questions such as, "What could this dealer stand to improve about their operation?"

Recognize that a reference from someone you know is even more valuable than a reference the dealer provides. Talk to your industry contacts about their air compressors – find out what they like and don't like about their compressor and their dealer. That information can make a big difference in your purchasing decision.

Air compressor pricing

Since air compressors range from sub-1 HP home models to 10,000 hp industrial giants, there is an extremely wide range of prices. General pricing for basic types is fairly consistent.

At the very smallest end of the spectrum, the less than 1 HP market, you're probably better served going to Sears or Home Depot and buying one yourself, as opposed to going through a dealer. You can get an adequate compressor for simple home use for under \$500.

Most businesses will need something larger, though. The low end of the business market is around 5 HP, and that segment is dominated by reciprocating compressors that cost around \$1,500 to \$2,000, depending on the brand and extras you choose. At these low power levels, rotary compressors are more expensive: you'll probably pay \$2,500 to \$4,000.

At around 10 HP, prices for reciprocating and rotary compressors begin to even out, in the neighborhood of \$4,000 to \$6,000. 25 HP is about as high as reciprocating compressors go, and that could cost \$10,000 or more. A similarly rated rotary model will run you \$7,000 to \$9,000.

50 HP rotary models, one of the most popular sizes, go for \$12,000 to \$15,000; a 100 HP model will be \$22,000 to \$28,000, and a 200 HP unit will cost around \$45,000. From there, pricing escalates: a centrifugal compressor with thousands of horsepower can cost millions of dollars.

Oil-free compressors will drastically increase your costs: you can expect to pay almost triple what you would for a traditionally lubricated compressor of the same size.

Dealers will generally sell service contracts that cover parts and repairs along with the compressors. They're usually pretty flexible: if you have mechanics on staff and don't need that coverage, they'll be happy to simply sell you the parts you need. If the compressor is critical to your operations, you can

sometimes pay extra for quicker service guarantees or around-the-clock coverage, but not all dealers will be able to offer this service.

You can get financing or \$1 buyout leases from most dealers, if the upfront cost is a challenge. If you have a short-term need, monthly rentals are also available in many cases.

Most compressors are sold new, but there are small markets for both leasing and buying used equipment. Since compressors are often central to critical business processes, purchasing new equipment is usually your best bet. Also, air compressors are reliable and not subject to technological obsolescence, so owners tend to hang on to them for a long time, reducing the number available in the used market.

Buying new gets you the associated warranties and service contracts, as well. Base manufacturers' warranties are one or two years "bumper to bumper," with additional years on major components.

Buying tips

You're in the driver's seat. There are more manufacturers than ever in the air compressor market. In addition, smaller compressors with lower costs are becoming more popular: the average compressor horsepower has fallen from 125 HP 20 years ago to around 40 HP today. These combine to give consumers a good amount of leverage. Talk to multiple vendors, and don't be afraid to negotiate to get the features you want.

Built to last. You can expect your compressor to last a long, long time. A rotary compressor has a life expectancy of 40,000 to 60,000 hours – that's 20 to 30 years at eight hours per day. You can expect at least 10 to 15 years from reciprocating compressors, and more if they're properly maintained. This longevity is another reason you should try not to base your decision on the initial purchase price: saving \$1,000 up front isn't going to make a difference to your business over 10 years.

Step up and down. Compressor manufacturers typically offer a wide range of models. If you find a brand and model you like that doesn't quite offer the power you need, there's typically another model that's one step up. Likewise, if you wind up over your budget, there's usually a slightly smaller unit you could consider, as well.

Keep speeds under control. Compressors are generally single-speed devices: when on, they operate at a specific RPM (revolutions per minute) setting. One trick some manufacturers use to reduce costs is to create smaller compressors that spin much faster, generating the same total CFM output and PSI at a much lower cost. The problem is, those high speeds can drastically reduce the lifespan of the compressor. Lower speeds are also quieter. If comparing two models with similar ratings but different RPMs, the lower RPM option is probably a better choice for the long run.

Ultimately, the best industrial air compressor dealers are those that treat your business like a partner, working with you to calculate what size compressor your company needs and finding the appropriate match. And the first step in locating the best dealer is using BuyerZone's free [air compressor price quote request service](#) to get connected to qualified suppliers in your area.

