



Selecting An Air Compressor

Sizing of the air compressor is the most important process one must complete before making any purchasing decision. If the compressor is too small, system air pressure will drop and air flow will not meet demand; if too large, initial product cost will be elevated and installation and power costs will be excessive.

The selection of an air compressor should be centered around eight (8) basic points:

Type of application?

The type of work you do is probably the most important factor in determining what type and size air compressor is best for you. Different businesses have varying requirements for compressed air. Do you intend on using the air six (6) hours per day/five (5) days per week, or do you intend to use the air only on occasion, say three (3) hours on Saturday afternoons? Are your demands for compressed air relatively constant during the day, or do they vary widely? Do not buy an air compressor for your application simply because someone else bought a particular size and "it works great for them." There could be a whole lot they are not telling you about how often they use their air compressor and exactly what tools and pneumatic devices they are operating. Buy basis "your" requirements, not someone else's.

Where will the compressor be located and how do you ensure proper ventilation?

Will the compressor be in a permanent location or will it be installed on a mobile service vehicle? Is the location indoors or outdoors? Indoor applications will be less expensive as compressors intended to operate outdoors typically require more expensive electrical systems for protection against water and freezing. Is the location clean or is it dirty? Since the majority of reciprocating air compressors are "aircooled", sufficient ventilation is crucial for the long term successful operation of the air compressor. Don't put the compressor in the broom closet, with no ventilation, and expect it to operate sufficiently.





Place the compressor at least three (3) feet from the wall to ensure proper cooling. Compressors put off heat, measured in terms of BTU's per hour. Make sure you provide adequate ventilation. A typical aircooled, reciprocating compressor puts off approximately 2800 BTU's per horsepower. Let's take a five (5) horsepower as an example: $5\text{HP} \times 2800 = 14,000 \text{ BTU/HR}$.

What pressure (PSI) do you require?

PSI, or pounds per square inch, through its intake as a measure of the compressor's capability to take the surrounding air and compress it to a higher pressure (PSI). The PSI capability of a compressor must match or exceed the PSI requirement specifications and pressure requirements for all tools and pneumatic devices you expect to operate. PSI is very important as it determines whether the unit you purchase should be a "single-stage" or "two-stage" compressor. Single-stage compressors typically have a maximum PSI rating of 125 PSI, whereas two-stage compressors typically have a maximum PSI rating of 175-200 PSI.

How much air flow (CFM) do you require?

CFM, or cubic feet per minute, is a measure of how much air flow the compressor is capable of "handling." CFM can be, and often is, stated in several different forms, dependent upon the manufacturer. For reciprocating compressors, some manufacturers choose to show their CFM rating as piston displacement (P.D.) P.D. is the volume of air swept through by the piston. In other words, the amount of air taken in on the down stroke of the piston. P.D. in no way is a reflection of how much air is actually "delivered" at the discharge of the compressor. No compressor is 100% efficient, therefore the amount of actual air delivered at the discharge port of the compressor will always be some number smaller than the P.D. rating. This delivered air is commonly referred to as CFM, or ACFM, the amount of "usable" air a particular compressor "delivers." A compressor may be rated for thirty-one (31) CFM, however this number may only refer to piston displacement (P.D.) of the pump.





In actuality, at 175 PSI, the "actual" delivered air may drop to twenty-six (26) CFM. Read the fine print and make sure you understand if the CFM rating is "piston displacement" or "actual delivered air" at a specified PSI. Actual delivered air (CFM) is the number that should be used to size tools and pneumatic devices, not P.D.

What motor horsepower do you require?

Horsepower is directly proportional to the CFM rating of a compressor; typically, the larger the horsepower the more air (CFM) the compressor can produce. You must first understand the "horsepower games" that are played to fully understand this statement. Motors are designed with what is referred to as the motor "service factor." What does this mean? It means that the horsepower capability of the motor is some number greater than the "name-plate" horsepower rating. Most compressor manufacturers design their compressors to utilize some portion of this available "excess" motor horsepower. Moving into this area of "excess" power is referred to as "brake horsepower." Industrial, high quality motors typically will have a service factor of (15%.) This means if you have a motor that has a nameplate rating of five (5) horsepower, the available power from that motor is 5.75 brake horsepower, or (15%) greater than the name plate rating. (5×1.15 service factor = 5.75 brake horsepower). Industrial, high quality compressor manufacturers design their compressors to operate no more than (10%) into the service factor, the available horsepower from that motor is 5.5 brake horsepower. Be very careful with compressors that claim to have some "higher" horsepower than normal, or higher than other compressor manufacturers. In all likelihood, the applied horsepower of the motor is greater than 15% and the result is a motor that even though it delivers more brake horsepower for a given application, the life span of the motor can be severely shortened as a result. Also, there are many types of motors, the most commonly used for small reciprocating compressors is referred to as an O.D.P. (Open Drip Proof) motor. This simply means that the motor is designed for "indoor" use only where small traces of water may occasionally be present. Outdoor applications require a different type motor for successful, long term operation.





What size air tank do you require?

Air tanks are simply a pressurized receiver into which the compressed air is discharged from the compressor. Air tanks help eliminate pulsation in the air line and also act as storage capacity during intervals when the demands exceed the capacity of the compressor. Air tanks are measured in terms of liquid gallons. This simply refers to the physical size of the tank. Typically, the larger the tank the more reserve, pressurized air is available for output. The smaller the tank, the more the pump has to operate simply to keep up with the system demand. Air tanks come in a broad range of sizes and are usually "mounted" to the air compressor. Look for tanks that carry the A.S.M.E. (American Society of Mechanical Engineers) stamp of approval. These tanks have been built using stringent quality procedures, thus offering superb quality and operator safety. Most tanks come standard with a manual drain valve. Float type, and solenoid operated automatic drain valves are available as an option. Dependent on your particular preventative maintenance characteristics, the automatic drain could save you from experiencing water damage as a result of not draining the tank for extended periods. Also, you should decide if your application requires a "vertical" or "horizontal" tank. Vertical tanks are available up to 10 horsepower. Horizontal tanks are available from 3 to 30 horsepower. Location of the compressor and personal preference will dictate whether you choose a vertical or horizontal air tank.

What pump features should you consider?

The quality of the compressor pump is probably the single biggest factor in terms of price and durability. The most common materials used in compressor pump construction are aluminum and cast-iron. Typically speaking, the low-cost, contractor series compressors will almost always use pumps constructed of aluminum. This helps keep manufacturing costs and street pricing to a minimum. For more demanding applications, look for compressor pumps that are constructed of 100% cast-iron. Typically, the fewer the number of moving parts in a compressor pump, the less the amount of potential down time.





Look for compressor pumps that feature splash lubrication design (pressurized systems with oil pumps are good, however they add to the cost of the compressor and maintenance), stainless steel finger valves, and one-piece connecting rods. Two-stage compressors should have separately cast cylinders for both stages, this aids in better cooling, less maintenance costs, and extended pump life. It is imperative that the user monitor the oil level as instructed in the operator's manual. Make sure the pump offers a convenient method for doing this. For more demanding applications, you should insist that the compressor offer some type of oil monitoring device. This is an inexpensive method of ensuring that your pump doesn't experience permanent damage as a result of running low on oil.

What are the electrical requirements of the Installation Site?

Incoming line voltage is very important to identify and understand when purchasing a compressor. The voltage will determine what size and how large a compressor (in terms of horsepower) you can use, without modifying your existing electrical system. 110 volt is the standard voltage for homes. 110 volt only has single phase capability and will only operate compressors up to 3 horsepower, maximum.

In North America, you will find the following voltages and phases available.

Voltages: 110 V 200 V 208 V 230 V 460 V 575 V

Phase : Single (1) Three (3)

