

# AIR POWER GLOSSARY

**Absolute Pressure** – the gauge pressure plus the atmospheric pressure. At sea level, the gauge pressure in pounds per square inch (PSI) plus 14.7 gives the absolute pressure in pounds per square inch (PSIA).

**Actual Capacity** – Actual capacity of an air or gas compressor is the quantity of air or gas compressed and delivered. Actual capacity is usually expressed in cubic feet per minute (ACFM) at compressor inlet conditions.

**Air Delivery** – term indicating the amount of compressed air delivered by an air compressor. Air delivery is measured in CFM or SCFM and is THE MOST IMPORTANT measure of air compressor performance. Air delivery is the basis for determining the suitability of a particular air compressor for an application. Air tools are driven by air delivery, CFM or SCFM, not by horsepower or tank size.

**Air Outlet/Hose Connection** – An air outlet/hose connection is a 1-1/4" NPT thread fitting where the air hose attaches.

**After Coolers** – Are devices for removing the heat of the compression of gas after compression is completed. After coolers one of the most effective means of removing moisture from compressed air.

**Aluminum Head** – An Aluminum head is located at the top of the compressor and is used on all Campbell Hausfeld products to help dissipate heat. The head contains a system of valves that allow air in and out of the compressor pump.

**ASME Code** – All Campbell Hausfeld commercial air compressor tanks (where applicable) are manufactured in strict compliance with the ASME (American Society of Mechanical Engineers) Code of standards for pressure vessels to ensure the safety of the end user.

**Auto/Off Switch** – When this is in the "Auto" position the compressor will cycle on and off as controlled by the pressure switch. When the switch is in the "Off" position, the compressor will not cycle, but any air remaining in the tank can still be used.

**Average SCFM** – This is the rating used on all Campbell Hausfeld air tools. This number is based on the average tool usage percentage.

**Belt Driven Pumps** – These compressors are a more traditional design and are generally designed for serious and heavy-duty do-it-yourselfers, professionals, and contractors. This type of compressor typically requires oil and utilizes a belt, pulley, and flywheel to drive the compressor pump. The motor and compressor pump is not fitted together directly.

**Blow-by** – is the small amount of compressed air that escapes from the cylinder past the piston rings and into the crankcase to exit through the breather. This blow-by is perfectly normal, to some extent, for all reciprocating air compressors.

**Booster Compressors** – Belt driven pumps have a flywheel and are driven by a belt that loops around a pulley on the motor drive shaft.

**Break In Period** – for an air compressor is the first 50 hours of run time. During this period, the piston rings and seals seat themselves to function at their designed levels. Following break in period, it is recommended that the oil be changed much like an automobile engine.

**Breather** – is a tube which vents crankcase pressure to atmosphere. It is normal for a small amount of oil residue to collect on the external surface of the breather.

**Cast Iron** – is the material of choice Campbell Hausfeld uses in its belt driven air compressor crankcases, crankshafts, and cylinders. Cast iron is stronger and more durable than aluminum in these critical compressor components.

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**CFM** – (Cubic Feet per Minute) is the flow rate of *pressurized* air usually at 90 PSI. This number is DIFFERENT than SCFM (Standard Cubic Feet per Minute)

**Check Valve** – is a one-way valve typically located at the fitting where air enters the tank from the pump. The check valve keeps the tank pressure from backing up to the pump. Failure of the check valve can cause excessive wear on the motor.

**Compressed Air** – compressed air is free air that has been pressed into a volume smaller than the compressed air normally occupies. As compressed air exerts pressure, the compressed air performs work when released and is allowed to expand to the normal free state.

**Consumer Air Compressors** – are lower priced, lighter duty, 115 VAC powered, reciprocating, often portable units sold through consumer outlets in high volume. Typical applications for these units include inflating car or bicycle tires, balls, and blowing leaves and dirt from garage floors.

**Continuous Run** – applications require that the air compressor pump run continuously. The pump may be switched from compressing air to simply moving air through the pistons without compressing it through the use of an unloading system. A typical head unloading system holds outlet valves open in the cylinder head. This mode of operation is desirable when the compressor motor is large enough to cause significant power fluctuations in the facility, or with gasoline engine-driven units that would require restarting.

**Contractor Air Compressors** – are compressors mounted on compact, rugged, portable frames, often with a wheel in a wheelbarrow fashion, for use by construction crews on job sites.

**Crankcase** – iron casting which is precision machined to support the cylinders and crankshaft.

**Crankshaft** – is driven by the motor via one or more belts and which in turn drives the pistons of the air compressor.

**Cut-in-Pressure** – is the preset tank pressure which the pressure switch contacts close and energize the motor turning the compressor ON.

**Cut-out-Pressure** – is preset tank pressure which the pressure switch contacts open and de-energize the motor turning the pressure OFF.

**Cylinder** – is a finned iron casting which is precision machined to accept pistons. The cast iron cylinder walls provide the ultimate balance between low wear and high heat dissipation properties.

**Cylinder Head** – is a finned aluminum casting which is precision machined to cover the valve plate. Aluminum was chosen for its superior heat dissipation property.

**Cylinder Sleeves** – are typically cast iron tubes inserted inside aluminum cylinders as a low cost method of providing the durability of cast iron cylinders.

**Direct Drive Compressors** – Direct Drive compressors have no flywheels, belts or pulleys. The motor shaft is directly connected to the pump drive shaft.

**Displacement of Compressor Cylinder** – is the volume swept through by the piston. The volume is usually expressed in cubic feet per minute (CFM).

**Displacement of a Multi-Stage Compressor** – is the first stage only, since the same gas passes through all stages in series. The volume is usually expressed in CFM.

**D-I-Y** – Do it yourself.

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**Double-Acting Compressor** – Double acting compressors allow compression to take place during both strokes per revolution in each compressing element.

**Duty-Cycle** – is the actual pump run time per hour compared to OFF time per hour expressed in percent. Applications range from very low to 100% duty cycles, where the pump is working hard constantly. A compressor with a 100% duty cycle may be undersized for some applications and fail prematurely.

**Flywheel** – is attached to end of crankshaft opposite the bearing cap and connects the pump via one or more belts. The flywheel also acts as a fan blowing cooling air across the fins of the compressor pump.

**Free Air** – is air at normal atmospheric conditions. Because the altitude, barometer, and temperature vary at different localities and at different times, free air does not mean air under identical conditions. Also known as **SCFM**.

**Horizontal Tank** – configurations have a pump and motor mounted on a tank with the long axis lying horizontally. Although this configuration requires a little more floor space, it is much more stable than the vertical configuration.

**Horsepower** – is a measure of power generated by an air compressor motor ranging from fractional (less than 1) up to hundreds. This information is always available on the motor nameplate unless the nameplate indicates that a SPCL, SPL, or special motor is being used, in which case the air compressor manufacturer is inflating the actual motor horsepower. Motor horsepower on an air compressor is a much less important measure of the performance of the compressor pump than SCFM.

**Industrial Air Compressors** - are moderate to a very high priced, heavy duty, hardwired to a 230 VAC and high power source, reciprocating type unit, ranging in horsepower from 5 to hundreds of horsepower. These air compressors can provide compressed air for a small machine shop to large factories.

**Installation Instructions** – for every commercial air compressor are included as part of the operating instructions. The manual includes a detailed wiring diagram for connecting power to the unit. The operating instructions also warn that electrical wiring should only be performed by a qualified electrician and that all applicable electrical codes should be followed.

**Intercoolers** – lowers the temperature of the air compressed in the low-pressure cylinder and carries it to intake of the high-pressure cylinder. This inter-stage cooling enables the second stage of compression to be accomplished more efficiently.

**Intermittent Duty** – is the most common duty cycle for consumer and commercial air compressors. The unit only runs when the pressure in the tank drops below cut-in and stops running if it can bring the tank pressure back up to cutout pressure.

**Load Factor** – Load factor is the ratio of the average compressor output during the period of actual use to the continuous rated output of the machine.

**Magnetic Starter** – this provides overload protection to non-thermally protected motors and are required when motor size exceeds the rating of the pressure switch alone to provide On-Off switching.

**Manifold** – A manifold is the control center of the air compressor and is attached to the tank by a pipefitting.

**Moisture Separators** – Moisture separators are devices for collecting and removing moisture precipitated from the air and gas during the cooling process.

**Motor** – The motor drives the compressor pump. The most common type of motor used on compressors is the induction motor. There are 3 different types used: 1.) Split phase motor (no capacitor); 2.) Capacitor start motor (1 capacitor); 3.) Capacitor start/capacitor run motor (2 capacitors).

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**Multi-Stage Compressors or Compound Compressors** – Multi-stage compressors or compound compressors allow the completion of compression from the initial to the final pressure is completed in two or more distinct steps or stages.

**Non-ASME Tanks** – Non-ASME tanks are not manufactured to ASME standards. These tanks are manufactured to strict Campbell Hausfeld design standards, and are no less safe than ASME tanks. The steel used to manufacture non-ASME tanks is not certified, but is actually heavier in gauge size than the steel used to manufacture the same ASME tank.

**Oil Carryover** – is the small amount of oil from the crankcase of lubricated air compressors which escapes past the piston rings into the cylinder and the compressed air stream. This is normal for all brands of oil lubricated air compressors. Oil carryover in Campbell Hausfeld compressors is typically less than 25 parts per million by weight.

**Oil-Free Air Compressors** – utilize an intermediate chamber between their oil filled crankcases and their cylinders. This intermediate chamber keeps most of the oil in the crankcase and out of the compressed air. This is old technology and has largely been replaced by oilless technology.

**Oil Lubricated** – air compressors have a reservoir of oil in their crankcases to lubricate the crankshaft bearings and other critical parts.

**Oilless Air Compressors** – have no oil in the crankcase. The crankshaft bearings are not oil lubricated. Since there is no oil in the compressor, no oil can be carried over to the compressed air.

**Operating Instructions** – inform the customer of installation, proper operation, preventive maintenance items, and possible hazards, are included with each air compressor and packout pump.

**Outlet Pressure Gauge** – displays the pressure selected by the regulator. The pressure should not be higher than the pressure displayed on the tank pressure gauge.

**Packout Pumps** – are available from Campbell Hausfeld as replacements for units in the field or for OEM applications. Packout pumps are bare pumps with no motor, tank, or controls.

**Piston Rings** – encircle each piston and provide an efficient seal between the high pressures generated inside the cylinders and the oil-filled crankcase. Ring wear is usually responsible for increased oil carryover.

**Pistons** – are precision-machined blocks driven up and down inside their cylinders by connecting rods and the crankshaft. The pistons are the components, which actually compress the air in reciprocating air compressors.

**Portable Air Compressors** – are small, compact and lightweight enough to be fairly easily carried to the point of use. Most consumer and contractor compressors are considered portable.

**Pressure Gauge** – indicates pressure level inside tank.

**Pressure Drop** – Loss in pressure between the compressor and air tool. All components in your air system will cause a pressure drop. Adjusting your pressure regulator can compensate this for.

**Pressure Lubricated** – air compressor pumps have small oil pumps that take oil from the crankcase and pump it through channels in the crankshaft to the bearings, similar to the way automobile engines are lubricated.

**Pressure Switch** – monitors the tank pressure and turns the compressor ON when the tank pressure falls below the preset cut-in point and turns it OFF when the tank pressure reached the preset cut-out point.

**PSI (Pounds per Square Inch)** – This is a measure of air pressure. In addition to requiring a minimum SCFM, airtools also require a certain PSI to operate properly.

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**Reciprocating Compressors** – use a reciprocating motion to compress air. Pistons intake air on the down stroke, and compress air on the up stroke.

**Regulator** – is a device that maintains a desired pressure at a predetermined value or varies that value accordingly. The pressure selected can be any pressure up to the maximum pressure displayed on the tank pressure gauge. The maximum pressure rating should never be exceeded.

**Replacement Parts List** – include an exploded view of the unit, are included with each Campbell Hausfeld compressor and pack-up pump.

**Rotary Air Compressors** – operate twin, intermeshing screws compressing air in a continuous motion. No pistons are involved. Rotary compressors are well suited for certain specialty applications.

**RPM (Revolutions per Minute)** – is a measure of speed of a rotating shaft either on the motor or the compressor pump.

**Safety Valve** – will open and relieve tank pressure if the tank pressure exceeds valve setting. This will occur if the pressure switch fails to turn off the compressor at the preset pressure.

**SCFM (Standard Cubic Feet per Minute)** – Also known as “FREE AIR.” This is air measured when it is NOT PRESSURIZED. This rating is DIFFERENT than CFM (Cubic Feet per Minute.)

**Scroll Air Compressors** – operate in a manner similar to rotary compressors, but with a slightly different technology. These are well suited for certain applications.

**Simplex** – is a configuration of air compressors which has a single pump on a tank, which is the most common. Medical installation requires duplex configurations (two pumps) in case one pump becomes inoperative. Other special applications may require triplex (three pumps) or more.

**Single Phase** – electrical power is the most common power available in most residential and commercial buildings. Single-phase power is commonly available in 115 and 230 volts. The power available at the customer’s location affects the choice of motor used on the air compressor.

**Single Stage** – compression indicates that intake air is compressed one time by the pump. Single stage compression is normally limited to a maximum pressure of 140 PSI.

**Splash Lubricated** – air compressor pumps use “dippers” (metal fingers attached to the base of the piston rods) to splash oil from the crankcase reservoir onto the bearings to keep them properly lubricated.

**Stationary Compressors** – are too large, bulky, and heavy to carry, and are usually hardwired into a wall mounted electrical disconnect, making portability out of the questions.

**Tank Size** – is usually expressed in US gallons and indicates how much compressed air can be stored for use. Tank size is not related to performance of the compressor pump, however, too small a tank can require a compressor pump to start and stop more frequently than would be necessary with a tank properly sized for the application. This frequent start/stop cycle can damage the electric motor.

**Three Phase** – electrical power is available in most heavy commercial and industrial buildings. Three phase power is commonly available in 208, 230, 460, and higher voltages. The power available at the customer’s location affects the choice of motor used on the air compressor.

**Two Stage** – compression indicates that intake air is compressed twice by the pump. Air is first compressed to an intermediate pressure in the low-pressure cylinder, cooled in the intercooler, then compressed again to 175 PSI in the high-pressure cylinder. Other specialty compressors may raise air to even higher pressures through multi-stage compression where air may be compressed three or more times to achieve pressures of thousands of PSI.

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**Unloader Valve** – is integral part of pressure switch and is mechanically activated when the switch contacts open. The valve bleeds off the air pressure between the pump and check valve so that the pump can start unloaded the next time the pressure switch senses the demand. Failure of this unloader can cause excessive wear on the motor.

**Valve Plates** – are cast plates onto which are mounted the intake and exhaust valves for each of the cylinders.

**Vertical Tank** – configurations have the pump and motor mounted on a tank with long axis standing vertically. This configuration requires the least floor space, but is less stable than a horizontal configuration because it is top heavy.

**Warranty** – information is part of every operating instruction manual.

