



...
**Devair
Automotive
and Industrial
Air Compressor Units**

...
**Compressors,
Unit Sizing,
On-Site Layout,
And
Compressed Air Systems**

This booklet is primarily geared to assist both Distributors and Customers in determining air demands in a shop, and designing a compressed air system to suit.

It provides general information on compressed air, Air Compressor Units, Refrigerated Air Dryers, Air Line Filters, and general requirements to make the various components operate as designed. Proper sizing, environment, and maintenance are key to a long and trouble-free compressed air system life.



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Introduction

Why Compressed Air ?

Compressed air is a very widely used form of power, second only to electrical power. (A third form of power that is very popular is hydraulic.) When a suitable and properly sized compressed air system is used, compressed air has many benefits over other forms of power.

Why choose compressed air over electrical or hydraulic power? There are several advantages of compressed air and compressed air systems. These include:

- A) compressed air is clean and safe, posing no electric shock or fire hazard.
- B) air tools run relatively cooler, as they do not generate heat while operating.
- C) air tools are relatively light (having a high power to weight ratio), therefore contributing to less worker fatigue and strain.
- D) air tools generally have variable speed and torque controls.

To follow is a brief comparison of each. (Though this by no means is a complete listing, it reflects what we feel to be the major points.)

Type:	Compressed Air	Electric	Hydraulic
Safety:	Reduces the danger of electrical shock or fire hazard. This is critical in some applications such as painting and mining.	May cause shocks or sparks, resulting in personnel and workplace safety issues.	Without expensive fire retardant fluids being used, exposure to fire or high temperatures may create fire hazards. Any leaks may result in contamination
Costs:	A single air source in a compressed air system allows for many separate systems. Also, as there are fewer moving parts and because of their simplicity in design, air tools provide low cost operation and maintenance.	More costly due to complicated componentry.	A hydraulic system may be complicated and costly when compared to a compressed air system.
Flexibility:	Portable Compressors can be used where other power sources are not available ie gas or diesel powered Units..	Limited to areas where electrical power is available.	Hydraulic systems are somewhat more complicated with regards to initial installation, and the frequent changing of tools is cumbersome.

General Definitions

To follow are basic terms and concepts that are used throughout this booklet. These are helpful in that they give a general understanding of compressed air.

What is atmospheric Pressure?

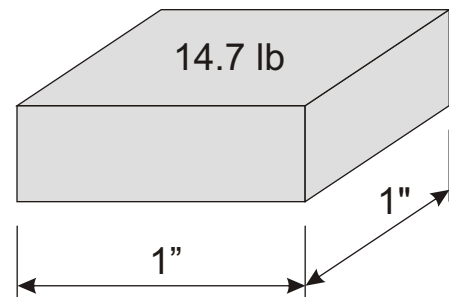
The air we breath, and that which surrounds the earth, has a weight associated with it. 'Atmospheric pressure' is a term that relates the weight of the air (ultimately the weight of the atmosphere) to a particular area on the earth's surface.

Area can generally be defined as a tract with both length and width. For arguments sake, lets use 1 inch long by 1 inch wide. In this example, the area of a tract 1" Long x 1" Wide is 1 square inch.

Now, the air we breath (the atmosphere) puts a weight of 14.7 pounds on every square inch of the earth's surface (at sea level. We'll deal with other elevations in the next paragraph.).(We didn't just decide this; it's one of the many Laws of Physics.) In other words, the 'atmospheric pressure' is 14.7 pounds per square inch at sea level, or more simply put, 14.7 psi. See Figure 1.

The figure of 14.7 pounds per square inch is the atmospheric pressure at sea level only. As you increase in altitude, the density of the air becomes less, and therefore the atmospheric pressure also becomes less. The actual pressure drop per 1000 feet in elevation is about 1/2 psi. For example, at 6000 feet above sea level, the atmospheric pressure will be 11.7 psi.

Due to the lower density and pressure at higher altitudes, Compressor output is also affected. A good rule of thumb is that air delivery is reduced by approximately 3% for every 1000 feet in elevation above sea level.



'Figure 1'
Atmospheric Pressure
(At Sea Level)

What is 'gauge pressure'?

Gauges found on Compressor Units simply measure the pressure of the air inside the Air Receiver above atmospheric pressure. This is commonly termed 'gauge pressure' or 'psig'. When disconnected from a Unit, a gauge will read '0 psi'.

A pressure gauge reading 175 psi simply indicates that the air pressure at that particular point is 175 psi above atmospheric.

Though not commonly used, 'absolute pressure' (psia) is the addition of both the gauge pressure and atmospheric pressure. In our example above:

$$\begin{aligned} \text{psia} &= \text{gauge pressure} + \text{atmosph. pressure} \\ &= 175 \text{ psig} + 14.7 \text{ psi} \\ &= 189.7 \text{ psia} \end{aligned}$$



'Figure 2'

General Definitions (cont'd)

What is Compressed Air ?

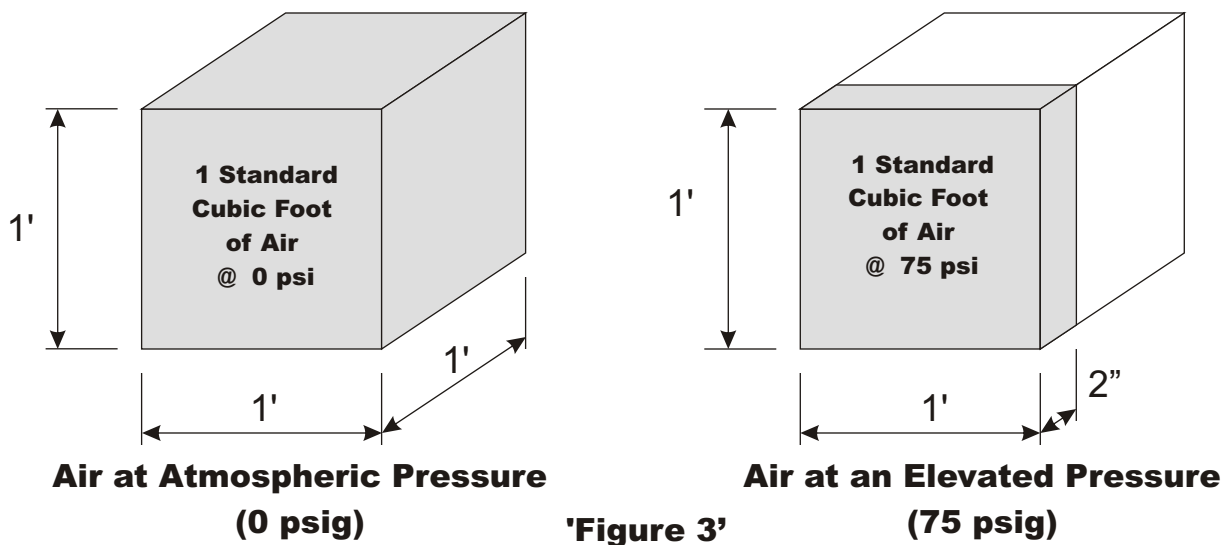
'Compressed air' is atmospheric air that has been forced into a volume smaller than it normally occupies.

At an air pressure above that of atmospheric pressure, the compressed air will always want to return to its normal, uncompressed state. It is this process that enables the compressed air to do work. This is similar to a spring, wanting to return to its shape at rest.

In dealing with air volume, we must have a unit of measure that is easily recognizable. The standard measure of air volume is 'Standard Cubic Feet'. The amount of volume used in a given period of time is generally measured in 'Standard Cubic Feet per Minute', or 'SCFM' for short.

Compressed air, as a whole, is generally measured as a volume of air dispensed over a period of time (CFM), and at a certain pressure (psi). An example: a Compressor Unit may provide 18 CFM @ 150 psi.

'Figure 3' shows the effect that compressing one cubic foot of air at 0 psi has when compressed to 75 psi. This figure shows that as the pressure of air increases, the volume decreases. At 75 psi, the volume of air is roughly 1/6 of that at 0 psi.



In order that Air Compressors are manufactured and tested in a uniform manner within the industry, testing and related data and efficiencies are made at what is termed 'Standard Air'. 'Standard Air' is considered to be air at a temperature of 68°F, atmospheric pressure of 14.7 psi, and a relative humidity of 36%.

Should the ambient temperature rise above 68°F, there will be a loss of air delivery equivalent to 2% for every 10°F increase in temperature.

Are there any 'by-products' in compressing air?

Typically, compressing air yields the discharge of both heat and moisture. The greater the air volume compressed, and the higher the pressure, the greater the heat generated. Moisture is simply caused by the inability of air to hold moisture as its pressure increases.

With proper guidance, as dealt with later in this booklet, heat and moisture need not be a concern.

Types of Compressor Units Available

There is a wide variety of Air Compressor Units available, Units used for anything from pumping up bicycle tires periodically to operating large and expensive industrial machinery 24 hours per day. As there is such a variation of uses and demands for compressed air, there are also Compressor Units suitable for each particular use.

Compressor Units are available in various configurations, each configuration being fairly unique based on Compressor volume, pressure, and HorsePower. To follow is a brief description of some of the more common Unit configurations.

What are the more common types of Air Compressors?

'Light Duty' Oilless Type

- * generally small, portable hand held, electrically driven Units
- * used for 'household' applications, hobbyists
- * oil free operation, so no oil downstream
- * not moisture free
- * generally run constantly while connected to power
- * air delivery is limited from about 1 to 3 CFM
- * air pressures are in the 30 to 40 psi range
- * inexpensively priced, widely available, very little maintenance required

Reciprocating Type

- * though available in portable Units, the majority of the larger Units are stationary
- * used for 'household' (portables), automotive, and industrial applications
- * generally use an oil lubricated Compressor Pump, so oil downstream is a consideration
- * generally run intermittently (ie. not 'on' continuously)
- * air delivery generally limited to approximately 125 CFM (typically a 30 HP Unit)
- * air pressure is 150 to 175 psi maximum
- * moderately priced, automotive/industrial Units available through select distribution, regular maintenance required

Rotary Screw Type

- * generally available as stationary Units, though some portable Units are also available
- * generally used in industrial applications, and those where great volumes of air are required, on an almost continuous basis
- * generally oil lubricated Compressor Pump (Air End)
- * air delivery available to several thousands of CFM
- * typical Units have a maximum air pressure of 120 psi, though they can go as high as 200 psi
- * relatively expensive to purchase, available through select distribution, regular maintenance is critical (by competent service company, and though somewhat more expensive than reciprocating Units, maintenance is less frequent)

Though this is by no means a complete listing of all types of Compressors, it does note the major Units available. For intermittent applications below 30 HP, the most commonly used Unit is the Reciprocating Compressor Unit due to its moderate pricing, relative simplicity, and substantial performance characteristics.



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'Single Stage' versus 'Two Stage' Reciprocating Units

Reciprocating Compressor Units are further classified as either Single Stage or Two Stage. These classifications deal only with the Air Compressor Pump, and are a method of describing how the air is processed and brought from atmospheric to maximum pressure.

What is a 'Single Stage' Pump?

A 'Single Stage' Pump is a Pump in which one or more Cylinders brings the air from atmospheric to maximum pressure in a single stroke of the Piston. In a Pump where there is more than one Piston, the Pistons are the same size.

Typically, Single stage Pumps can produce air pressures to a maximum of 125 psi, and are therefore limited in their use.

'Figure 4' shows a typical 'Single Stage' Pump. Though a One Cylinder Pump is shown, they are not limited to that (one Cylinder), as noted above.



'Figure 4'

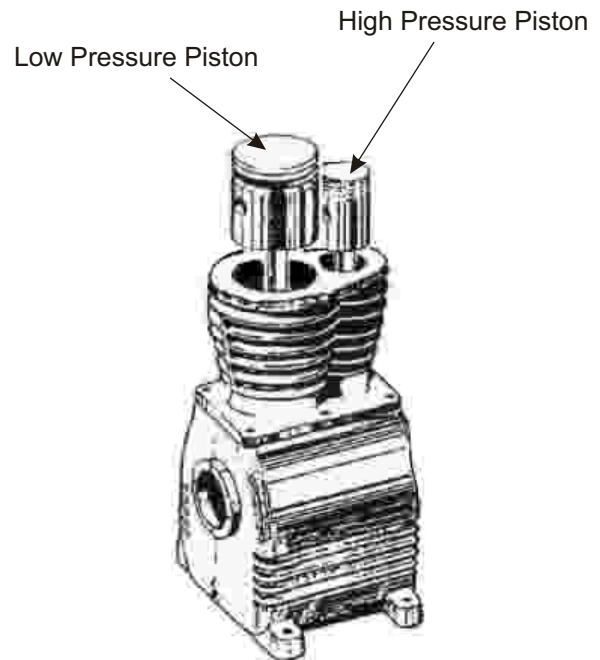
What is a 'Two Stage' Pump?

A 'Two Stage' Pump is a Pump in which two Cylinders/Pistons bring the air from atmospheric to maximum pressure. The Cylinders/Pistons consist of one large Piston (also known as the Low Pressure) and one smaller one (known as the High Pressure).

During the first stage, the air enters the larger (or Low Pressure) Cylinder, where it is compressed to approximately 50 psi. The air then travels through a cooling tube to the smaller (or High Pressure) Cylinder (the second stage), where it is further compressed to maximum pressure. Two stage Pumps can generally produce air pressures to a maximum of 175 psi to 200 psi, and are therefore more suitable to automotive / industrial applications.

'Figure 5' shows a typical 'Two Stage' Pump, indicating the difference in the sizes between the first stage (Low Pressure) Cylinder / Piston and the second stage (High Pressure) Cylinder / Piston.

Two stage Pump may have more than two Cylinders and Pistons.



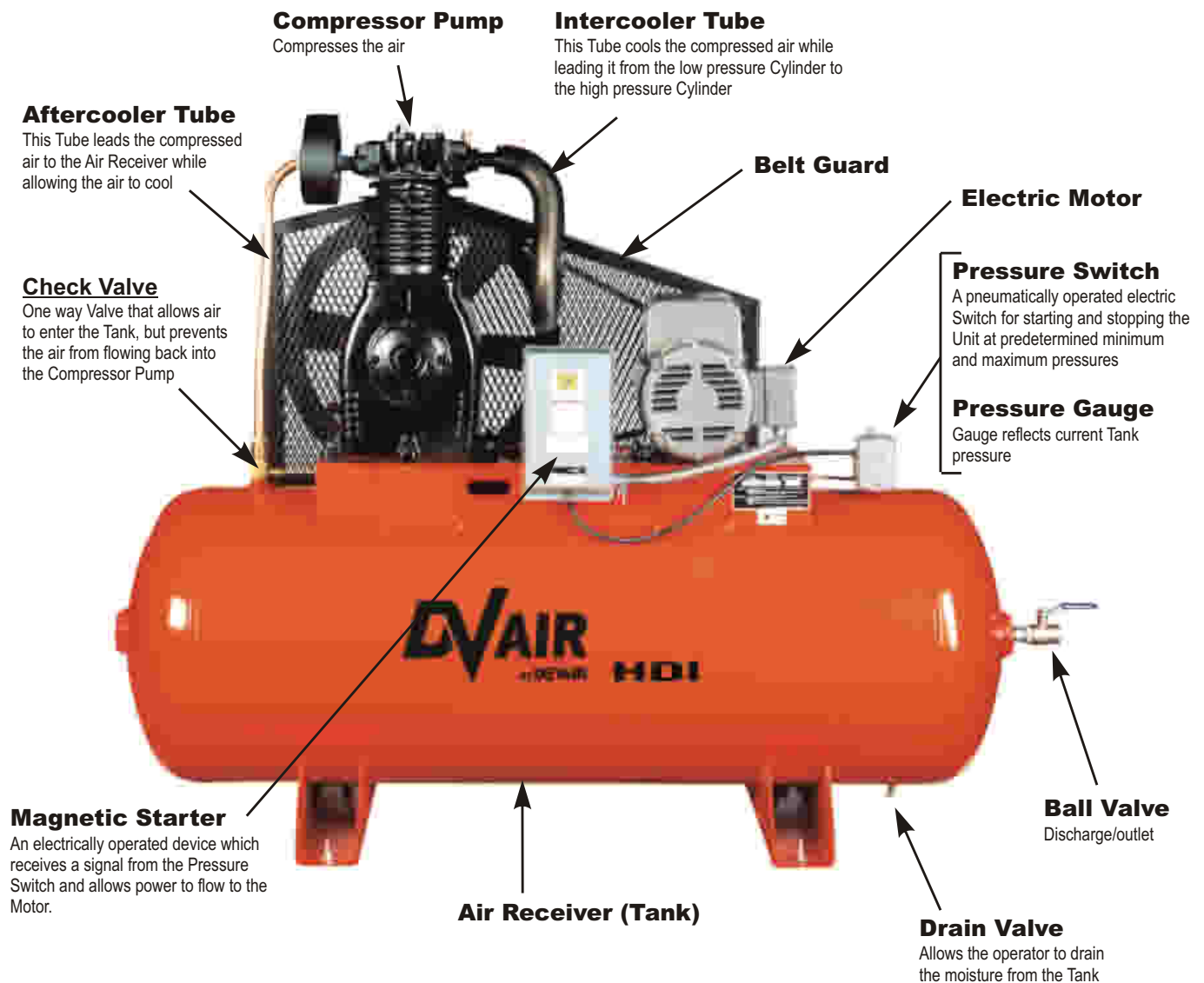
'Figure 5'

Standard Components of a Reciprocating Air Compressor

What are the standard Parts of a Reciprocating Compressor?

A standard Reciprocating Compressor, in both the vertical and horizontal format, generally consists of a Pump, an Air Receiver (built in accordance with ASME requirements), an Electric Motor, and a variety of associated electrical and pneumatic Controls.

'Figure 6' shows the various Parts of a Reciprocating Compressor, and a brief description of each.



'Figure 6'
Standard Reciprocating Compressor Components



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Air Compressor Unit Sizing Guide

How do I select a Unit to suit my Customer's needs ?

In order to provide a customer with a meaningful quotation that reflects a Compressor Unit that will handle their compressed air requirements, one must first determine what air volumes and pressures are required on site, and then choose a Unit to suit. To follow is a 'Six Step' Method in selecting the right sized Compressor for your customer's air requirements.

Six Steps to Assist in Selecting the Right Size Compressor

1. Separate the Equipment into two categories.

This should be based on both Continuous and Intermittent use. Make a list of all the air tools and equipment intended for use with the Compressor. Hand triggered tools (air impact wrenches, nailers, etc.) are generally considered Intermittent. Air motors or sand blasters, on the other hand, create a steady demand on the Compressor all the while they are operating, and can therefore be considered Continuous.

2. Determine the total CFM requirements for each type of equipment being used.

Using 'Chart 1' on 'Page 10', list the free air consumption for the items in each category and multiply the CFM required for each tool by the number of similar tools to be used.

Example: If there are two different stations, each using a 5" body sander, the total consumption would be
2 sanders x 5 CFM each = 10 CFM

3. Total the CFM for the items in both the Intermittent and Continuous categories.

Example:

Intermittent Use:

Item:	CFM:	Qty:	Total:
1/2" Impact	4	1	4
Body Sander	5	2	10
Spray Gun	10	1	10

Total Consumption: 24 CFM

Continuous Use:

Item:	CFM:	Qty:	Total:
3/32 Sand Blaster	7	1	7

Total Consumption: 7 CFM

4. Combine the Total Consumption for Intermittent and Continuous Use.

For Intermittent use, the total consumption is generally multiplied by a factor of .40 to reflect an approximate 40% intermittent use of the various tools. Using our example in '3',
 $24 \text{ CFM} \times .40 = 9.6 \text{ CFM}$

For continuous use, you must use the full value of the various tools.

The Total Consumption for the Compressor would then be as follows:

$$9.6 \text{ CFM (Int.)} + 7.0 \text{ CFM (Cont)} = 16.6 \text{ CFM}$$

Note: If a number of intermittent air tools are to be used simultaneously in a continual demand situation, replace the 40% (.40) in the formula with a figure that better represents the actual percentage of operation, ie 60% (.60) or 70% (.70).

5. Divide the 'Total Consumption for the Compressor' as determined in '4' by .75 .

In order to allow the Compressor to cool properly, we must allow for downtime between cycles. The dividing of the Total Consumption by .75 allows for this.

6. Apply the total CFM requirement as calculated in '5' to the Devair Compressor units as noted in 'Chart 2' on Page 10.

Ensure that the maximum output pressure of the Compressor Unit is sufficient to handle any of the tools used. In an instance where two tools are used by the same operator, but never at the same time, list only the tool with the higher air consumption.

Adjusting the formula to suit individual shop requirements is reliant on a first-hand knowledge of the total shop operation. If care is taken to include all air consuming equipment, a good assessment of the total consumption can be made.



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Air Compressor Unit Sizing Guide (cont'd)

Chart # 1 Automotive and Industrial Type Tools and Equipment

Air Operated Equipment	Pressure Range (psi)	Average Air Cons. (CFM)	Air Operated Equipment	Pressure Range (psi)	Average Air Cons. (CFM)
Air Filter Cleaner	70-100	3	Hydraulic Lift **	145-175	5.25
Air Motor Paint Pot	70-100	10-14	Impact Wrench 1/4"	70-100	2.5
Airless Pumps	100	8-24	Impact Wrench 3/8"	70-100	3
Automatic Drill	70-100	6	Impact Wrench 1/2"	70-100	4
Bead Breaker	70-100	8	Impact Wrench 5/8"	70-100	6
Body Polisher	70-100	2-8	Impact Wrench 3/4"	70-100	10
Body Sander 5"	70-100	4-6	Impact Wrench 1"	70-100	12
Body sander 7"	70-100	9	Impact Wrench 1-1/4"	70-100	19.2
Body Sander Heavy Duty	70-100	11	Nutsetter - up to 3/8"	70-100	8.4
Brake Tester	70-100	3.5	Nutsetter - up to 3/4"	70-100	10.5
Burring Tool	70-100	4-5	Paint Stirrer	70-100	15
Bushing Tool	70-100	15-25	Panel Cutter	70-100	13
Car Rocker	120-150	5.8	Pneumatic Door	120-150	2
Car Washer	70-100	8.5	Pneumatic Jack	120-150	0.5
Carbon Remover	70-100	3	Pneumatic Nailers & Staplers	100	6
Carving Tool (Stone)	70-100	10-15	Radiator Tester	70-100	1
Circular Saw 8"	70-100	15.8	Rammer	70-100	5-7
Circular Saw 12"	70-100	23.8	Ratchet 1/2"	70-100	5
Compression Riveter	70-100	1	Retread Mold	70-100	5
Cylinder Hoist	70-100	1.3	Rim Stripper	120-150	6
Drill 1/16" to 3/8"	70-100	4	Rivet Buster	10-100	35
Drill 3/8" to 5/8"	70-100	7	Sandblaster 3/32" Nozzle	80	7
Duster Gun (Blow Gun)	70-100	2.5-10	Sandblaster 1/8" Nozzle	80	15
Engine Cleaner	70-100	5	Sandblaster 5/32" Nozzle	80	25
Filing and Sawing Machine	70-100	3.5	Sandblaster 3/16" Nozzle	80	40
Floor Jack	100	6	Screwdriver #2 to #6 Screw	70-100	4.2
Grease Gun (High Pressure)	120-150	3	Screwdriver #6 to 5/16" Screw	70-100	8.4
Grinder (Die, Small)	70-100	5.3	Spark Plug Cleaner	70-100	5
Grinder (Die, Medium)	70-100	8.4	Spark Plug Tester	70-100	0.5
Grinder (Horizontal 2")	70-100	7	Spray Gun - Auto / Refinishing	75	8.5-12
Grinder (Horizontal 4" and 6")	70-100	21	Spray Gun - Paint / Production	50-75	8.5-15
Grinder (Horizontal 8")	70-100	28	Spray Gun - Paint / Touch up	30-60	3
Grinder (Vertical & Sander 5")	70-100	12.3	Spray Gun - Undercoating	70-100	19
Grinder (Vertical & Sander 7")	70-100	21	Spring Oiler	70-100	4
Grinder (Vertical & Sander 9")	70-100	24.5	Tapper - up to 3/8"	70-100	3
Hammer, Air	70-100	3.5	Tire Changer	120-150	1
Hammer, Chipper	70-100	7	Tire Inflation Line	125-150	1.5
Hammer, Fender	70-100	21	Tire Spreader	120-150	1
Hammer, Riveter	70-100	15	Trans. & Differential Flusher	70-100	3
Hammer, Scaler	70-100	4	Vacuum Cleaner	120-150	6.5
Hammer, Tire	70-100	18			

** For 8000 lb capacity; Add 0.65 CFM for each additional 1000 lb capacity.

Note: 1) The above figures are estimates only. Please consult your particular equipment manufacturer for current air consumption figures.
 2) Air Tool manufacturers generally list their tool air consumption in terms of 'free air delivery', ie air simply flowing through the tool with no load. Under loading, air consumption may vary drastically from published values. Consult the equipment manufacturer for realistic consumption values.

Chart # 2 Standard Devair Air Compressor Units

Req'd Press.	Req'd Capacity	Unit HP	Tank Size (US Gal)	Req'd Press.	Req'd Capacity	Unit HP	Tank Size (US Gal)
100 psi	2.0 CFM	1/2 HP	30 Gallon Horizontal	150 psi	19.8 CFM	5 HP	80 Gallon Horiz or Vert.
	3.0 CFM	3/4 HP			25.9 CFM	7-1/2 HP	
	3.9 CFM	1.0 HP			36.8 CFM	10 HP	
	5.6 CFM	1-1/2 HP			52.1 CFM	15 HP	120 Gallon Horiz or Vert.
	5.6 CFM	2 HP			87.0 CFM	25 HP	
125 psi	7.0 CFM	2 HP	80 Gallon Horizontal	99.9 CFM	30 HP	240 Gallon Horizontal	
	11.4 CFM	3 HP		25.9 CFM	13 HP Gas		30 Gal Horiz.

Note: Though the 5 to 30 HP electric Compressor Units are noted as being 150 psi, they are pre-set at the factory at this pressure. It is possible to run the Units at 175 psi by simply adjusting the Pressure Switch.



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Additional Info Required Before Quoting

What other information do I need to know before quoting ?

On-Site Electrics

Air Compressors are available in a variety of electrical voltages, and in both single and three phase Units. **Before providing a quotation to your customer, ensure that you know the on-site electrics, and choose the correct Compressor to suit.**

Please find on 'Page 12' electrical specifications pertinent to the standard Devair line of Compressor Units. It notes information required to ensure that a customers site is capable of operating the Unit in a safe and correct manner.

Helpful Tips to Remember Concerning Unit Electrics

- 1) Though single phase Units are available, **use three phase Units when on-site electrics allow.** Single phase Units require much more power (and are therefore more costly) to both start and operate.
- 2) **Single phase Units are available only in 5 HP and 7-1/2 HP configurations.** Should your customer have need of a larger Unit (but only has single phase power available), provide multiples of the 5 HP and 7-1/2 HP Units.
- 3) Over the course of a day, on-site voltage may vary depending on demand. Motor manufacturers are aware of this, and allow a variance of the nameplate Motor voltage +/- 10%.

Example: Nameplate voltage: 460 volt
 Maximum allowable: 506 volt (460 + 10%)
 Minimum allowable: 414 volt (460 - 10%)

When choosing a suitable Compressor Unit for certain on-site electrics, **ensure that the building voltage (at the Unit) is within the +/- 10% of the Motor voltage** variance as noted above.

Example: On-site voltage: 208-60-3 (208 volt, 60 cycle, 3 phase)
 Suitable Motor: 200 volt (200 + 10% = 220 max allowable)

Note: Though a 230 Volt Motor will handle the 208 on-site electrics, should the building voltage drop below 207 volts (230 - 10%), premature Motor failure could occur. Use a 200 Volt Motor.

Premature Motor failure due to incorrect on-site voltage (in relation to Motor voltage) is not covered by the manufacturers Warranty.

- 4) **All electrical work should be carried out by a competent Electrician**, and done in such a manner that it meets all applicable Codes and Regulations.

Should you have any questions concerning electrical componentry required, local Codes or Regulations, etc., contact your Electrician, local governing authority, or the Compressor manufacturer.

- 5) **All Devair Heavy Duty Cast Iron Compressor Units require a Magnet Starter** to provide overload protection to the Electric Motor. The Starter may be purchased with the Unit or separately.
- 6) Though every attempt is made to ensure that Compressor Units are manufactured to the governing standards, **any inspections required on site by a local authority are done at the customer's expense.**



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Additional Info Required Before Quoting (cont'd)

What electrical loading will the Unit put on the building ?

As noted on Page 11, Compressor Units are available in a variety of electrical configurations. Noted below are standard Devair Compressor Unit configurations with their electrical data. Please be advised that this information is correct at the time of publishing this booklet. It may vary slightly, dependent on manufacturer and/or supplier design and specification changes.

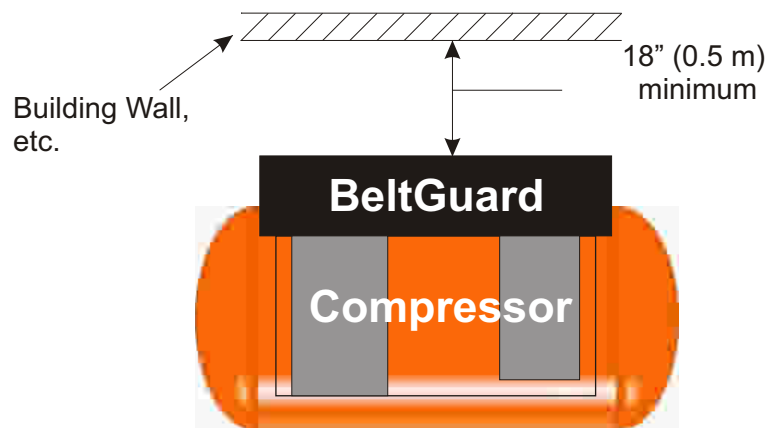
Unit HP	Unit Model Number	Phase	Voltage	Motor Amps (Nameplate)	Max. Allow. Amp Draw	Amps Req'd @ Start-up				
½	Unit Model Number Dependent on Configuration	Single	115	8.4	9.6					
			230	4.2	4.8					
		Three	208/230	2.0	2.3					
			460	1.0	1.1					
			575	0.8	0.9					
¾	Unit Model Number Dependent on Configuration	Single	115	10.2	11.7					
			230	5.1	5.8					
		Three	208/230	3.0	3.4					
			460	1.5	1.7					
			575	1.2	1.3					
1	Unit Model Number Dependent on Configuration	Single	115	13.4	15.4					
			230	6.7	7.7					
		Three	208/230	2.8	3.2					
			460	1.4	1.6					
			575	1.1	1.2					
1-1/2	Unit Model Number Dependent on Configuration	Single	115	18.0	20.7					
			230	9.0	10.3					
		Three	208/230	4.2	4.8					
			460	2.1	2.4					
			575	1.7	1.9					
2	Unit Model Number Dependent on Configuration	Single	115	20.4	23.4					
			230	10.2	11.7					
		Three	208/230	5.6	6.4					
			460	2.8	3.2					
			575	2.2	2.5					
3	Unit Model Number Dependent on Configuration	Single	115	32.0	36.8					
			230	16.0	18.4					
		Three	208/230	8.0	9.2					
			460	4.0	4.6					
			575	3.2	3.6					
5	Unit Model Number Dependent on Configuration	Single	230	23.0	26.4	140				
			200	15.2	17.4	96				
		Three	230	13.2	15.1	94				
			460	6.6	7.6	47				
			575	5.3	6.1	38				
7-1/2	Unit Model Number Dependent on Configuration	Single	230	31.0	35.6	184				
			200	23.0	26.4	171				
		Three	230	21.6	24.8	150				
			460	10.8	12.4	75				
			575	8.0	9.2	49				
10	Unit Model Number Dependent on Configuration	Single	200	31.0	35.6	202				
			230	28.0	32.2	180				
		Three	460	14.0	16.1	90				
			575	11.0	12.6	72				
			200	43.0	49.4	285				
15	Unit Model Number Dependent on Configuration	Three	230	37.0	42.5	242				
			460	18.5	21.2	121				
		VAVC-5000	Three	575	14.7	16.9	97			
				200	43.0	49.4	313			
	25	VAY-5081	Three	230	38.8	44.6	272			
				460	19.4	22.3	136			
				30	VAY-5081	Three	575	15.5	17.8	109
							200	69.0	79.3	446
	30	VAY-5081	Three	230	62.0	71.3	384			
				460	31.0	35.6	192			
575				23.8	27.3	151				
200				81.0	93.1	535				
30	VAY-5081	Three	230	72.0	82.8	488				
			460	36.0	41.4	244				
			575	28.0	32.2	177				

Installation - Mechanical

There are many factors which are important in the correct and safe location of the Compressor Unit. These factors include both environmental conditions as well as accessories that you may purchase.

Where should I locate the Compressor Unit ?

The drawing below (Figure 6) shows the recommended space requirement of a good installation. A horizontal Compressor Unit is shown.



'Figure 6'

Locate the Unit in a cool, dry, well ventilated area.

The Compressor Units perform at their optimum capabilities when in an environment of temperature 68° F, atmospheric pressure of 14.7 psi, and relative humidity of 36%. Though this is not possible in a normal working environment, there are several key things that the Customer can do to ensure that the Compressor works as designed. These are as follows:

- * **Place the Unit in a cooler part of the shop.** Hot environments may lead to premature Pump failure and excessive oil bypassing.
- * **The Area in which the Unit is placed should be relatively dry.** Excessive humidity will cause a buildup of moisture in the Pump (thereby causing possible premature deterioration) as well as water in the oil.
- * **The Unit should be a minimum of 18" from a building wall or nearest obstruction.** This allows maximum air flow around and over the Unit, thereby having a maximum cooling affect.
- * As the Motor provided on the Compressor is a General Purpose (GP), Open Drip Proof (ODP) Motor, **the Unit should be located in a clean area.** Dust could find its way into the Motor and cause premature failure. Also, dust/dirt on the Compressor Pump will cause higher operating temperatures and could result in premature failure.
- * **Locating the Unit in a separate room,** away from the general operations of the shop, **will provide a more suitable environment,** as well as containing the noise from the Compressor.



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Installation - Mechanical (cont'd)

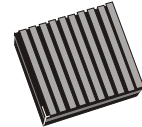
What Accessories should be purchased with the Unit ?

Though there are various Accessories that are available for your Compressor Unit, not all are necessary for its safe and correct operation. To follow is a breakdown of what Devair would consider to be both 'Necessary Accessories' and 'Optional Accessories'.

Necessary Accessories.

Vibration Isolator Pads.

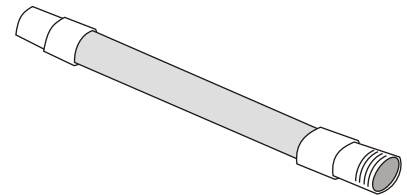
The Vibration Pads are used to absorb any undue vibration caused by the Unit, allow the Unit to run marginally quieter, and allow for any irregularities in the shop floor.



Vibration Pads

Flexible Connector.

A Flexible Connector should be used in the air line directly downstream from the Unit. The Flex Connector protects the building piping from any undue vibration caused by the Unit, as well as allowing for any mis-alignment between the Unit and the piping.

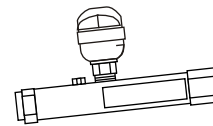


Flexible Connector

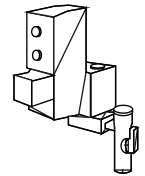
Optional Accessories.

Automatic Tank Drains.

The Compressor Tank must be drained on a daily basis, as per the manufacturers instructions. A buildup of water in the Tank will both limit the Compressor performance, and potentially cause moisture in your air lines as well as causing the Tank to deteriorate prematurely. An Automatic Drain, either Pneumatic or Electronic, may be purchased to ensure that the draining is done on a regular basis.



Pneumatic

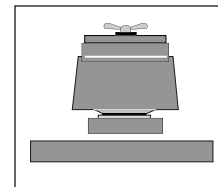


Electronic

Automatic Tank Drains

Remote Air Intake Kits.

A Remote Air Intake Kit allows cooler, outside air to be drawn into the Air Compressor Unit. This ensures that the Unit uses relatively clean, cool air, thereby lowering the Compressor operating temperature and allowing it to operate more efficiently.



Remote Air Intake

Low Oil Safety Monitors.

The Low Oil Safety Monitor automatically shuts the Compressor Unit off when the oil level in the Pump has gone below an acceptable level.



Low Oil Safety Monitor

Installation - Electrical

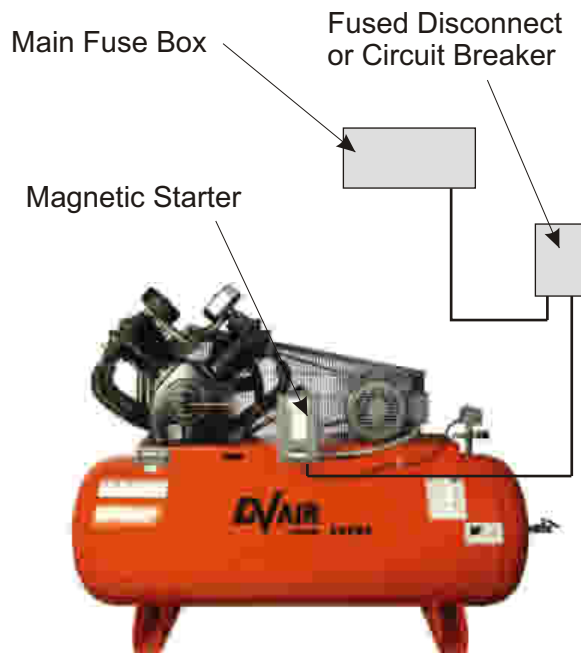
How do I hook the Unit up to my building ?

It is responsibility of the Compressor owner to ensure that the Compressor Unit is electrically connected in a safe and correct manner. Any electrical work should be carried out by a competent Electrician, and be done in such a way that it meets all applicable Codes and Regulations.

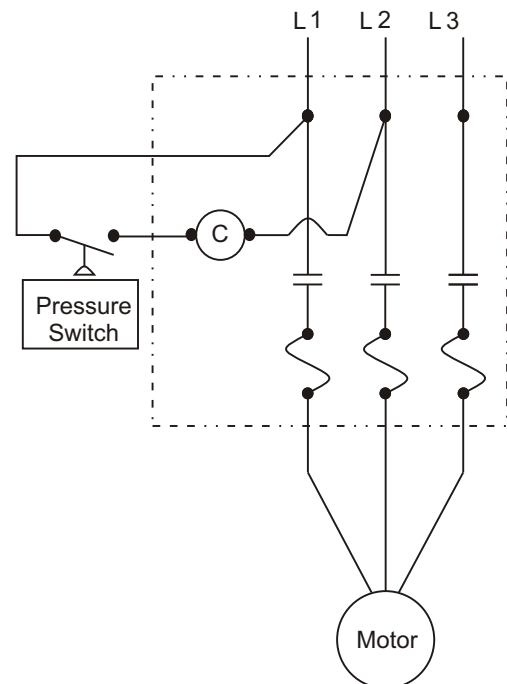
A Magnetic Starter, as shown below, is not required on the Pit Boss line of Units, but must be an integral part of the Heavy Duty Cast Iron Compressor Unit circuit as it provides overload protection to the Electric Motor. A Magnetic Starter can be purchased separate from the Unit, or factory-mounted at time of manufacture.

WARNING

Failure to connect the Compressor correctly to your building's electrical services may result in serious personal injury, or damage to equipment.



'Figure 7'
Typical Pictorial Representation
of Compressor Installation



'Figure 8'
Typical Magnetic Starter Wiring
(Subject to Local Codes & Authorities)

Start-Up Procedures

What is involved in the 'initial start-up' of the Unit ?

The following is a guideline which the Customer must follow in the correct initial start-up of their new Compressor Unit. Please pay close attention to the various Notes, Cautions, and Warnings.

WARNING

1. Please note that, under normal operating conditions, the Compressor Unit will operate intermittently. The Unit starts/stops without warning.
2. Shut off all power to the Air Compressor Unit before attempting any repair or maintenance.

NOTE

Do not attempt to operate the Unit without first checking whether there is Oil in the Pump. Add Oil as required. Serious damage may result from use, however limited, without Oil.

- 1) Remove the Oil Filler Plug, and ensure that there is Oil in the Crankcase. Refer to the "Lubrication" section in the pertinent Compressor Unit manual for the proper type and level of Oil.
- 2) Replace the Oil Filler Plug, and tighten as required. Refer to Compressor Unit manual.
- 3) Do a visual inspection of the Unit, and ensure that all Bolt heads are sufficiently tightened. This must be done, as some fasteners may become loose in transit.
- 4) Turn the Compressor 'On' momentarily by positioning the Fused Disconnect in the 'On' position. Ensure that the Flywheel is turning in the correct direction. Pit Boss Units rotate only one way. For Heavy Duty Units, see "Pump Rotation" (page 10) in Unit manual.

NOTE

On Compressors with 3 phase power, adjust the wiring at the Motor terminals if the rotation is incorrect. Refer to the wiring diagram on or in the Motor terminal box.

CAUTION

Do not place any materials on or against the Belt Guard, or the Compressor Unit as a whole. Placing materials there will limit the cooling of the Compressor, and could lead to premature failure.

- 5) Open the Compressor's Ball Valve, and start the Unit. Ensure that the air is escaping to atmosphere. Allow the Unit to operate in this fashion for approximately 30 minutes. This lubricates the Pistons, Bearings, and all internal surfaces.
- 6) After having run the Compressor Unit for 30 minutes, close the Ball Valve, and allow the unit to reach maximum operating pressure. Ensure that the Compressor shuts down at the pre-set maximum pressure, and the head pressure is released through either the front of the Pump (the CPR) or at the Pressure Switch.
- 7) Check the Compressor and Piping Systems for air leaks, and correct as required.
- 8) Stop the Compressor, and check the Oil level in the Crankcase. Add Oil as required.

NOTE

During the first few days of operation, check the Unit periodically to ensure it is running smoothly and the controls are operating properly. Should you notice any areas of concern, contact your Devair Distributor or Authorized Service Centre.

Preventative Maintenance Schedule

What regular maintenance is required ?

As with all pieces of equipment, a Compressor Unit must be serviced / maintained on a regular basis. If this is not done, the Customer will experience unscheduled problems, perhaps leading to complete failure of the Unit. To follow are general guidelines to follow. When purchased, your Unit may have varying requirements.



When servicing the Air Compressor, shut off all power to the Unit, and drain the Tank of air pressure. Always replace the BeltGuard after adjusting the Belts or Pulleys.

To follow are general Maintenance guidelines based on an approximate Compressor usage of **40 hours per week**. If your usage varies from this, adjust accordingly. (Consult the literature that accompanies your Compressor Unit for the exact Maintenance Schedule for your Unit.)

MAINTENANCE

DAILY

- ▶ Drain moisture from tank



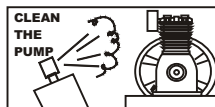
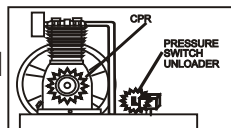
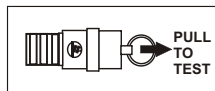
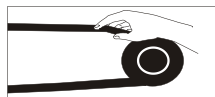
WEEKLY

- ▶ Check oil level and top up if necessary



QUARTERLY

- 1 Change Oil & Filter
Order Maintenance Kit
- 2 Check condition and alignment of Belt, Flywheel and Motor Pulley
- 3 Check Safety Valve
- 4 Check Pressure Switch Unloader or CPR Unloader to ensure Compressor Head unloads whenever Motor shuts down
- 5 Clean and/or blow off Pump Fins and Motor



Please consult operating manual included with your Air Compressor for detailed maintenance information



It is the responsibility of the compressor owner to ensure that a regular Maintenance Schedule is followed.

2000 Hour Maintenance

Though not noted on the "Maintenance" label (shown at left), the Compressor should have a more thorough Unit overhaul every 2000 hours. (Based on a 40 hour work week, 2000 hours is roughly once a year.) To follow are items that should be included in this procedure.

- ▶ Lubricate Motor Bearings.
- ▶ Inspect and replace as necessary the following:
 - ▶ Pump Valves
 - ▶ Check Valve(s)
 - ▶ Safety Valve(s)
 - ▶ Pressure Gauge
 - ▶ Belt(s)



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The Purpose of an Air Dryer

Why do I need a Refrigerated Air Dryer ?

A Brief Physics Lesson.

Though not readily visible, water vapour is present in the atmosphere that we live in. When an Air Compressor is used to increase the pressure of air from atmospheric to something higher, the increase in pressure tends to force the water vapour to condense into water droplets. As there is a great deal of heat present in the compressing of the air, and the warmer the air temperature the more moisture it can hold, the hotter compressed air leaves the Compressor Unit with all the moisture present in a vapour state. In other words, the air has all the moisture in it still in vapour form, none of it has changed to a liquid state.

As the compressed air travels through the compressed air system, and cools down to the ambient temperatures, the water vapour held in the air begins to condense into liquid droplets inside the air lines. The temperature at which the water vapour begins to form into liquid droplets is known as the 'dew point'.

And What Will a Dryer do for Me ?

Air containing moisture may not be harmful to some industries, but it may be very harmful to others. Applications such as the autobody refinishing industry and HVAC installations are areas where moisture content is very critical, resulting in inferior finishes or damaged controls and componentry.

With a Refrigerated Air Dryer, the compressed air is cooled down to a temperature at which the moisture content is condensed into a liquid state. The Dryer then, by way of an internal Separator, discharges the liquid. The key to the Refrigeration Unit is the ability to dry the air at a dew point temperature below the lowest temperature to which the compressed air will be exposed.

With a properly sized and maintained Refrigerated Air Dryer, and coupled with suitable filtration, moisture at your point of use will be non-existent.

How can I Justify the Expense ?

1. Tool maintenance will be reduced. Water, oil, and additional contaminants may cause tools to stick, jam, or clog.
2. Tool life will increase. Water washes away lubricants, causing excess wear and corrosion.
3. Air consumption will be reduced. More air is used when it contains water, oil, etc in order to blow out sludge. Also, water will corrode the inside of the air lines.
4. Production will be increased. Workers can use their tools immediately, as there is no need to purge water or contaminants from the air lines.
5. Piping life is extended indefinitely as internal water corrosion is eliminated.
6. Production quality is improved and maintained there. Instruments, etc are sensitive to water and contaminants. Poor air quality may cause poor product quality, increased rejects, and production shut-downs because of malfunctioning controls and tools.
7. Spray paint production is boosted. Water on or under the paint surface will cause both blisters and paint runs, requiring both refinishing and repainting.
8. Trap maintenance down-stream of your Refrigerated Air Dryer is almost eliminated. The only maintenance required regularly is at the Dryer Separator.
9. New installations will not require pitched air lines, drop legs, traps, or drains.



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Available Refrigerated Air Dryers

What types of Dryers are available through Devair ?

Devair offers two varieties of Refrigerated Air Dryers, namely the 'DRD Refrigerant Dryer' series and the 'PD Prodry' series. Though both series of Dryers provide dry compressed air to your point of use, there are some noticeable differences between the two Units.

A Comparison of the Devair 'ASD' and 'Prodry' Series of Refrigerant Dryers.

	'ASD' Refrigerant Dryer	'HTD' Series Refrigerant Dryer
Maximum Inlet Temperature (The maximum allowable temperature of compressed air entering the Dryer inlet)	120°F (49°C)	180°F (83°C)
Suggested Length of Piping Between Compressor Outlet and Dryer Inlet	Approximately 20 Feet	Minimum of 3 to 4 Feet
Maximum Inlet Pressure (The maximum allowable pressure of compressed air entering the Dryer inlet)	200 psig (13.8 Bar)	232 psig (16 Bar)
Controls Available	Unit controlled by Microprocessor Digital 'dew point' Indicator Some Unit parameters adjustable	Unit controlled by Microprocessor Digital 'dew point' Indicator Some Unit parameters adjustable
Initial 'In-line' Air Strainer (Removes larger contaminants from the compressed air before entering the Dryer)	No	No
Internal Filter	High Efficiency Stainless Steel Baffles guarantee a low pressure drop and smooth operation	High Efficiency Stainless Steel Baffles guarantee a low pressure drop and smooth operation
Internal Auto Drain (Drains moisture from Separator Assy periodically)	Yes - Electronic Type	Yes - Electronic Type
Internal AfterCooler	No	Yes
Refrigerant Cycle Dew Point	33°F - 39°F (1°C - 4°C)	37°F (3°C)



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Available Refrigerated Air Dryers

What information should I know before ordering ?

To follow is basic information concerning both the 'ASD' and 'HTD' Series of Devair Refrigerated Air Dryers. This information is both required for ordering the correct Unit, as well as ensuring the Installer is aware of the mechanical requirements.

'ASD' Series of Refrigerant Dryers.

Model	Air Comp. HorsePower	SCFM	Electrics	Inlet/Outlet	Width	Depth	Height	Weight
ASD15	5 HP	15	115/60/1	1/2" NPT	15.4"	18.1"	15.8"	64#
ASD30	7-1/2 HP	30		1/2" NPT	15.4"	18.1"	15.8"	66#
ASD40	10 HP	40		3/4" NPT	17.3"	23.6"	21.6"	104#
ASD60	15 HP	60		3/4" NPT	17.3"	23.6"	21.6"	110#
ASD100	25 HP	100		1-1/2" NPT	19.0"	32.1"	38.5"	198#
ASD150	30 HP	150	230/60/1	1-1/2" NPT	19.0"	32.1"	38.5"	216#
ASD200		200		1-1/2" NPT	19.0"	32.1"	38.5"	232#
ASD320		320		2-1/2" NPT	28.0"	57.0"	38.5"	353#
ASD400		400	230/60/3	2-1/2" NPT	28.0"	57.0"	38.5"	420#

'HTD' Series of Refrigerant Dryers.

Model	Air Comp. HorsePower	SCFM	Electrics	Inlet/Outlet	Width	Depth	Height	Weight
HTD18	5 HP	18	115/60/1	3/4" NPT	17-1/4"	23-7/8"	21-3/4"	80#
HTD26	7.5 HP	26		3/4" NPT	14-3/8"	19-5/8"	26"	75#
HTD37	10 HP	37		3/4" NPT	14-3/8"	19-5/8"	26"	80#
HTD52	15 HP	52		3/4" NPT	14-3/8"	19-5/8"	26"	86#

Note: The models noted are available at the time of printing. Please contact Devair by phone or visit our website at 'www.devair-compressors.com' for the most current models.

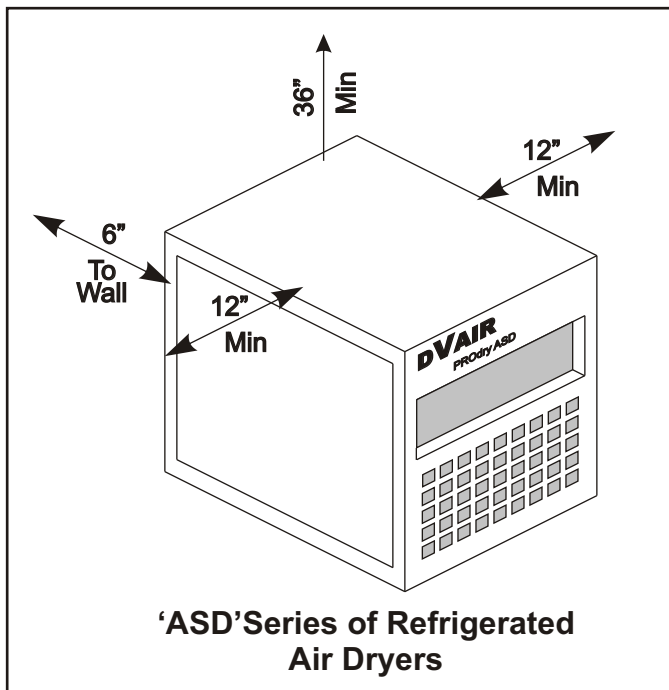
Installation - Mechanical

Where should I locate the Refrigerated Air Dryer ?

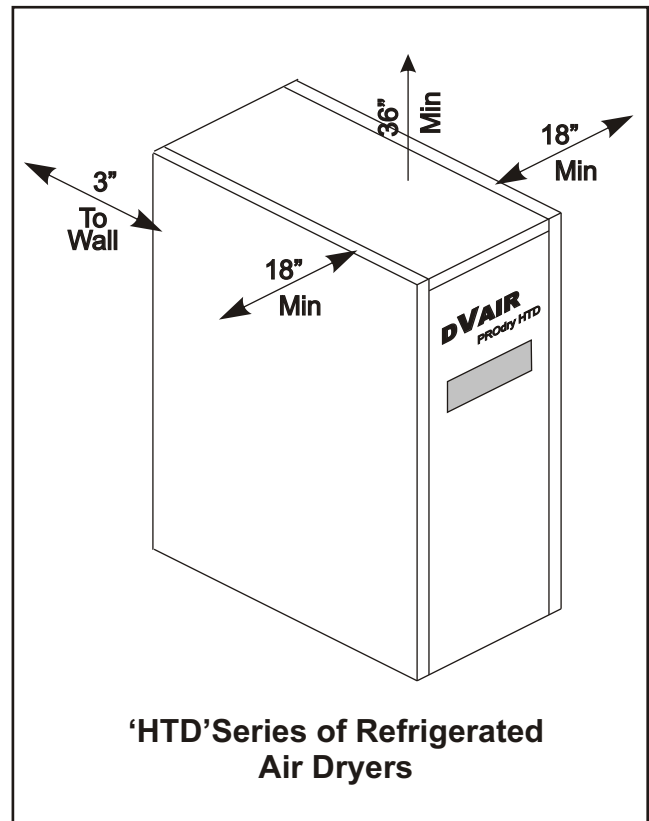
As with the Air Compressor Unit, the Refrigerated Air Dryer must be installed in an environment that allows for both its correct and safe operation. To follow are some basic points in deciding where to install the Dryer.

- * **Place the Dryer in a cooler part of the shop.** The refrigeration system requires relatively cool air to function at its optimum. When placed in a very warm environment, the refrigeration system must work much harder to cool the air, thus becoming less efficient.
- * **The Unit should not be located in a dusty environment.** The interior of the Dryer Unit contains items which must be kept clean to work efficiently. Any build-up of dust and debris will limit the operation of the Unit, and may cause failure.
- * **Locating the Unit on a suitable pedestal will ensure that floor dust is not drawn into the Unit.**

To follow are suggested clearances around both the 'ASD' and 'HTD' Series of Devair Refrigerated Air Dryer Units.



To ensure that there is enough clearance in front of the Unit for proper access, please allow a minimum of 24" between the front of the Unit and any adjacent obstructions.





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Installation - Electrical

How do I connect the Dryer to power ?

The Devair Dryer Units are equipped with a suitable cord and plug to be installed in the appropriate electrical receptacle of proper voltage.

To follow is a listing of the various Dryer Units and their electrical requirements. Please make note of the Full Load Amp and/or Circuit Fuse requirements when installing the Unit, ensuring that the building circuit is suitable for the Dryer Unit.

Do not, under any circumstances, modify the internal or external wiring of the Unit. Electrical modifications may cause both electrical failure in the Unit, as well as void the manufacturers 1 (One) Year Limited Warranty.

'ASD' Series of Refrigerant Dryers.

Model	Electrics	Nominal Amps	Full Load Amps
ASD15	115/60/1	1.97	2.3
ASD30		3.5	4.3
ASD40		4.58	6.25
ASD60		4.58	6.25
ASD100		7.08	9.82
ASD150		230/60/1	5.84
ASD200	6.78		8.98
ASD320	10.3		13.7
ASD400	230/60/3	3.69	4.93

'HTD' Series of Refrigerant Dryers.

Model	Electrics	Nominal Amps	Full Load Amps
HTD18	115/60/1	4.23	5.24
HTD26		2.6	3.5
HTD37		4.58	6.25
HTD52		4.58	6.25

As the Devair Refrigerated Air Dryer require electricity to operate, the Units must be installed in such a manner that they comply with all applicable electrical codes.

Also, the Dryer Units are equipped with electrical enclosures not suitable or intended for installation in hazardous environments.

As with all electrically operated devices, when performing any service work on the Unit, disconnect the Unit from the power supply. Servicing or maintaining the Unit while connected to power could result in serious injury to personnel and the Unit.



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Air Line Filtration

Why do I need Filtration in my Compressed Air System ?

A compressed air system is typically contaminated with impurities which could ultimately cause serious problems where clean air is critical. As noted in the section dealing with the Refrigerated Air Dryers, applications such as the the autobody refinish industry and HVAC installations require compressed air that is free of contamination.

Impurities that can be found in a compressed air system may include solid particles, water droplets, and oil aerosols and vapours. With suitable Air Filters in the system, and paying close attention to both the type and size (of Filters) required, your Customer can obtain the air quality that their application demands.

Please be advised that in areas and applications where air quality is of great importance, suitable filtration in the air system coupled with a properly sized Refrigerated Air Dryer will provide the best possible compressed air. And, as with all compressed air componentry, though the correct selection of the components is important, maintenance is crucial in ensuring both suitable air for your needs, and achieving long life from your equipment.

What types of Filters are available ?

To follow are the four basic Air Line Filters that Devair has available in their product line, listing a brief outline of their particular application. Also, on the page to follow, please find a chart outlining the correct size of Filter to use based on your Compressor HorsePower and/or CFM requirements, as well as a listing of various relevant specifications.

The current line of Compressed Air Filters allows the (4) series of Filter Elements as noted below to be installed in one Cannister, namely the 'SAF-C'. (Please use the a suffix reflecting the volume of air.)

'SAF-S' Series of Prefilter Moisture Separators (5 micron).

- * Removes large liquid loads and all solid particles three microns and larger
- * Removes 99% of liquid water
- * Generally used in air systems without Aftercoolers or Refrigerated Air Dryers

'SAF-A' Series of Coalescing Filters (1 micron).

- * Removes all liquid water, oil aerosols, and solid particles one micron and larger
- * Used as a general Filter for shop air, a pre-filter for high efficiency Filters, an after-filter for Pressure Swing Desiccant Dryers, or a 'point of use Filter on systems using Aftercoolers or Refrigerated Air Dryers

'SAF-E' Series of High Efficiency Coalescing Filters (.1 micron).

- * Removes 99.99% of oil aerosols for virtually oil-free air, as well as solid particles 0.1 microns and larger
- * Generally used with oil-lubricated air compressors where oil-free air is critical, ie spray and powder painting, plastic moulding, instrumentation and control applications

'SAF-V' Series of Activated Carbon Oil Vapour Removal Filters.

- * Removes oil vapour and odour
- * Generally used in food and drug packaging where compressed air may come into contact with the product



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Air Line Filtration

What types of Filters are available ?

	Compressor HorsePower	5	7.5 & 10	15	25 & 30				
Model	Capacity (CFM)	18	35	64	120	177	336	441	583
Cannister Assembly		SAF-C-18	SAF-C-35	SAF-C-64	SAF-C-120	SAF-C-177	SAF-C-336	SAF-C-441	SAF-C-583
Separator Filter (5 micron)		SAF-S-18	SAF-S-35	SAF-S-64	SAF-S-120	SAF-S-177	SAF-S-336	SAF-S-441	SAF-S-583
Coalescing Filter (1 micron)		SAF-A-18	SAF-A-35	SAF-A-64	SAF-A-120	SAF-A-177	SAF-A-336	SAF-A-441	SAF-A-583
Hi Eff. Coalescing Filter (0.1 micron)		SAF-E-18	SAF-E-35	SAF-E-64	SAF-E-120	SAF-E-177	SAF-E-336	SAF-E-441	SAF-E-583
Act. Carbon Oil Vap Remov. Filter		SAF-V-18	SAF-V-35	SAF-V-64	SAF-V-120	SAF-V-177	SAF-V-336	SAF-V-441	SAF-V-583
Connection Ports (NPT)		3/8"	1/2"	3/4"	1"	1"	1-1/2"	2"	2"
Weight. Lbs.		1.3	1.3	1.5	2.4	2.5	3.0	7.9	8.2

Note: When ordering a Filter Assembly, please specify both the Cannister Assembly and the specific Filter Element.

Differential Pressure Gauges and Auto Drains.

Differential Pressure Gauges are standard on all of the Filter Assemblies as noted above. The following Gauges are used:

All Assemblies	Internal Auto Drain	Part No. 'SAF-102'
18 to 120 CFM	'Cat Eye' Gauge	Part No. 'SAF-103'
177 to 583 CFM	Needle Type Gauge	Part No. 'SAF-104'

As well, a Float Type Auto Drain is used with all Assemblies.

Note: The models noted are available at the time of printing. Please contact Devair by phone or visit our website at 'www.devair-compressors.com' for the most current models.



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Compressed Air Systems

Is there a 'rhyme or reason' to a system design ?

In designing a compressed air system for your Customers shop, there are several factors that must be considered. Though cost is always a factor in most designs, it cannot be the final determining factor, especially in situations where air quality, volume and pressure are critical.

Several factors that ensure a correct air system design are as follows:

- * Use a full loop piping layout.
- * Run the Compressor and distribution system at high pressure. Regulate the air pressure at the point of use.
- * Use a suitable size of piping (based on Compressor CFM and length of piping) to keep the total pressure drop in the system below 1 psi.
- * Always take drops from the top of the main headers.
- * Join pipe lengths with tees in order that additional drops can be added easily at a later date.
- * Piping material must meet all applicable provincial/state and federal codes and regulations.

Correct Pipe Sizing.

As noted, determining the correct size of piping in the Customers shop is based upon the Compressors output and the length of piping. Incorrect sizing of the piping will adversely affect the pressure or volume of air at the point of use.

Unit HorsePower	Length of Piping		
	0'-100'	100'-200'	200'+
1/3 HP	1/4"	1/4"	1/4"
1/2 HP	1/4"	1/4"	1/4"
3/4 HP	1/2"	1/2"	1/2"
1 HP	1/2"	1/2"	1/2"
1-1/2 HP	3/4"	3/4"	3/4"
2 HP	3/4"	3/4"	3/4"
3 HP	3/4"	3/4"	1"
5 HP	3/4"	3/4"	1"
7-1/2 HP	3/4"	1"	1-1/4"
10 HP	1"	1-1/4"	1-1/2"
15 HP	1"	1-1/4"	1-1/2"
25 HP	1-1/4"	1-1/2"	1-1/2"
30 HP	1-1/4"	1-1/2"	1-1/2"

Piping Material.

As with the correct sizing of the compressed air piping, the material used must also be considered. Though cost might be a concern, correct air flow, quality, safety, and longevity are factors that will out-weigh the initial cost.

Many types of piping can and have been used in compressed air systems. These include (but are not limited to) PVC, iron, galvanized iron, and copper piping.

Experience has proven that copper pipe is the best material available to date for a compressed air system. Though copper may also be the most expensive initially to purchase, it is relatively easy to work with, can withstand pressures associated with compressed air, and is impervious to corrosion.

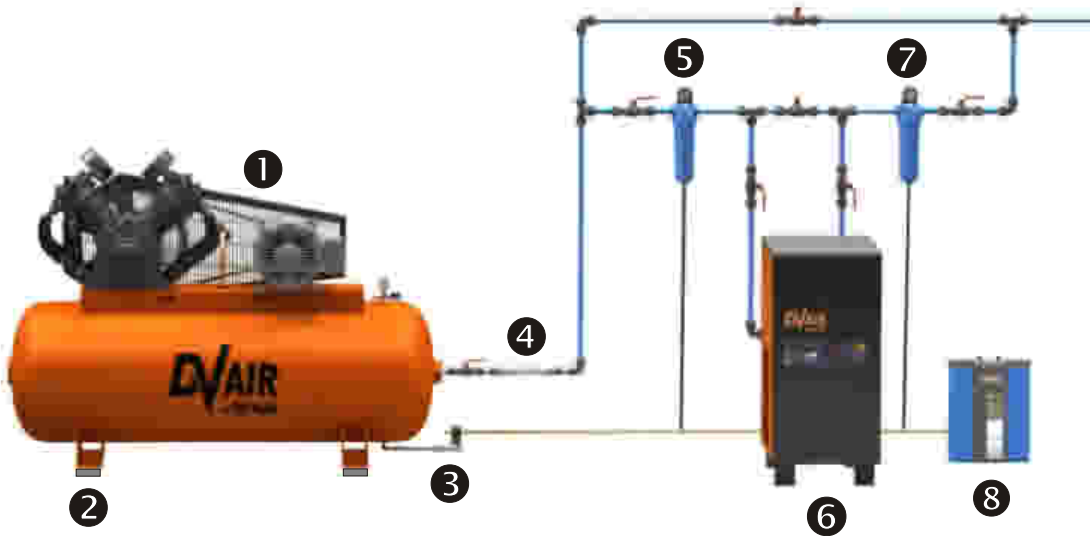
Though there may be newer alternative designs of piping available on the market, copper piping is to this point the most commonly used

Note: The size and materials used in the piping system may be governed by local Codes or Regulations. Please consult local authorities to ensure that your system design meets with all applicable criteria.

Compressed Air Systems

A typical air piping system.

Shown below is a typical compressed air layout, high-lighting the characteristics which should be incorporated into each good compressed air system. Please refer to 'Page 27 & 28' for a brief description of the various numbered items.



	Component:	Description:
①	Air Compressor:	is the heart of the compressed air system. Ensure it is sized for the application, is installed in a safe and correct manner, and is maintained according to the manufacturers guidelines.
②	Vibration Isolators:	absorb any vibration caused by the Compressor, allow for any irregularities in the floor, and make the Unit marginally quieter.
③	Automatic Drain:	drains the Compressor Tank on a regular basis.
④	Flex Hose:	protects the building air lines from any undue vibration caused by the Compressor, and allows for any mis-alignment between the Unit outlet and the building piping.
⑤	Separator Filter:	acts as a pre-filter to the Refrigerated Air Dryer.
⑥	Refrigerated Air Dryer:	removes the moisture from the compressed air by lowering its temperature.
⑦	Coalescing Filter:	removes oil from the compressed air
⑧	Oil-Water Separator:	separates the oil from the moisture drained by the Refrigerated Air Dryer and Filters. The oil is trapped by internal Filters, while the water is allowed to be dispensed to the building drain.