
CHAMPION[®]

C1-1-608
1st Edition
July, 1999

**A-SERIES
COMPRESSOR/VACUUM PUMP**

MODELS

3" STROKE

**APLGAA, APLGBA
APLHAA, APLHBA**

4-1/2" STROKE

**APOGAA, APOGBA
APOHAA, APOHBA**

**PARTS LIST
OPERATING AND
SERVICE MANUAL**



**MAINTAIN COMPRESSOR RELIABILITY AND PERFORMANCE WITH
GENUINE CHAMPION® COMPRESSOR
PARTS AND SUPPORT SERVICES**

Champion® Compressor genuine parts, manufactured to design tolerances, are developed for optimum dependability --- specifically for compressor systems. Design and material innovations are the result of years of experience with hundreds of different compressor applications. Reliability in materials and quality assurance are incorporated in our genuine replacement parts.

Your authorized compressor distributor offers all the backup you'll need. A worldwide network of authorized distributors provides the finest product support in the air compressor industry.

Your local authorized distributor maintains a large inventory of genuine parts and he is backed up for emergency parts by direct access to the Master Distribution Center (MDC) in Memphis, Tennessee.

Your authorized distributor can support your air compressor with these services:

1. Trained parts specialists to assist you in selecting the correct replacement parts.
2. A full line of factory tested ChampLub™ compressor lubricants specifically formulated for use in Champion® compressors.
3. Repair and maintenance kits designed with the necessary parts to simplify servicing your compressor.

Authorized distributor service technicians are factory-trained and skilled in compressor maintenance and repair. They are ready to respond and assist you by providing fast, expert maintenance and repair services.

For the location of your local authorized Air Compressor dealer refer to the local yellow pages of your phone directory or contact:

Distribution Center:
Master Distribution Center
5585 East Shelby Drive
Memphis, TN 38141
Phone: (901) 542-6100
Fax: (901) 542-6159

Factory:
Champion
1301 N. Euclid Ave.
Princeton, IL 61356
Phone: (815) 875-3321
Fax: (815) 872-0421

INSTRUCTIONS FOR ORDERING REPAIR PARTS

When ordering parts, specify Compressor **MODEL**, Method of Cooling, **HORSEPOWER** and **SERIAL NUMBER** (see nameplate on unit). Serial Number is also stamped on top of the cylinder flange to the right of the inlet housing.

All orders for Parts should be placed with the nearest authorized distributor.

Where NOT specified, quantity of parts required per compressor or unit is one (1); where more than one is

required per unit, quantity is indicated in parenthesis. **SPECIFY EXACTLY THE NUMBER OF PARTS REQUIRED.**

DO NOT ORDER BY SETS OR GROUPS.

To determine the Right Hand and Left Hand side of a compressor, stand at the motor end and look toward the compressor. Right Hand and Left Hand are indicated in parenthesis following part name, i.e. (RH) & (LH), when appropriate.

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FOREWORD

Champion® Compressors are the result of advanced engineering and skilled manufacturing. To be assured of receiving maximum service from this machine the owner must exercise care in its operation and maintenance. This book is written to give the operator and maintenance department essential information for day-to-day operation, maintenance and adjustment. Careful adherence to these instructions will result in economical operation and minimum downtime.

DANGER

Danger is used to indicate the presence of a hazard which will cause severe personal injury, death, or substantial property damage if the warning is ignored.

WARNING

Warning is used to indicate the presence of a hazard which can cause severe personal injury, death, or substantial property damage if the warning is ignored.

CAUTION

Caution is used to indicate the presence of a hazard which will or can cause minor personal injury or property damage if the warning is ignored.

NOTICE

Notice is used to notify people of installation, operation or maintenance information which is important but not hazard-related.

SAFETY PRECAUTIONS

Safety is everybody's business and is based on your use of good common sense. All situations or circumstances cannot always be predicted and covered by established rules. Therefore, use your past experience, watch out for safety hazards and be cautious. Some general safety precautions are given below:

DANGER

Failure to observe these notices could result in injury to or death of personnel.

- **Do not operate unit if safety devices are not operating properly. Check periodically. Never bypass safety devices.**
- **Keep fingers and clothing away from revolving fan, belts and sheaves.**
- **Do not use the air discharge from this unit for breathing - not suitable for human consumption.**
- **Do not loosen or remove the oil filler plug, drain plugs, covers, or break any connections, etc., in the compressor air or oil system until the unit is shut down and the air pressure has been relieved.**
- **Electrical shock will result in injury or death to personnel. Open main disconnect switch before working on the control.**
- **Compressor unit must be grounded in accordance with the National Electrical Code.**
- **Disconnect the compressor unit from its power source, tag and lockout before working on the unit - this machine is automatically controlled and may start at any time.**
- **Do not modify unit without written permission from Manufacturer's Engineering Department.**

WARNING

Failure to observe these notices could result in damage to equipment.

- **Stop the unit if any repairs or adjustments on or around the compressor are required.**
- **An Excess Flow Valve should be on all compressed air supply hoses exceeding 1/2 inch inside diameter. (OSHA Regulation, Section 1926.302)**
- **Do not exceed the rated maximum pressure values shown on the nameplate.**
- **Bearings can be damaged by passage of current. Do not electric weld on the compressor or base.**
- **Inspect all pipe and tube connections for looseness or leakage on at least an annual basis.**

INSTALLATION AND OPERATING INSTRUCTIONS

The Installation and Operating Instructions should be read carefully before starting the unit.

LOCATION - The compressor should be installed in a clean, well-lighted place, with plenty of space all around it, and in such a manner as to be accessible from all sides. Do not place the unit too near other machinery or too close to the wall. The unit should be set on a firm foundation, with the feet shimmed to eliminate rocking and undue stresses when bolted to the foundation.

AIR FILTER - The intake of every compressor should be equipped with an air filter to prevent dust and other abrasives from being drawn into the cylinders.


In cases where no air filter is installed, the company will assume no responsibility for excessive wear of the pistons, piston rings, cylinder bore or valve details, even though such wear occurs very soon after the compressor is installed. To operate properly, filters must be kept clean.

INLET LINE - Where an inlet line is used between the air filter and the compressor, it must be thoroughly cleaned on the inside to prevent dirt or scale from entering the compressor. **If welded construction is used, the line must be shot blasted and cleaned to remove welding scale.** In either case, the inlet line must be coated internally by galvanizing or painting with a moisture and oil-proof sealing lacquer. Up to ten (10) feet in length, the inlet line should be the full size of the inlet opening on the compressor. If an extra-long line is necessary, the pipe size should be increased according to FIGURE 1, below.

Accessibility for inlet air filter servicing must be considered when relocating the filters from the unit to a remote location.


PIPING - Air discharge pipe must be the full size of the discharge opening on the air cylinder. The discharge pipe should be as short and direct as possible, eliminating short bends and fittings and avoiding pockets. A **Pressure Relief Valve** must be placed in the discharge line between the compressor and any shutoff valve,

check valve or aftercooler. The discharge line should be piped to the lowest opening in the air receiver.

 **DANGER**

Discharge air used for breathing will cause severe injury or death.

Consult filtration specialists for additional filtration and treatment equipment to meet health and safety standards.

 **DANGER**

Do not operate the compressor without the proper pressure relief valve. Overpressure operation may cause severe damage to equipment and personal injury.

As the air cools in being carried through the distributing lines to the point at which it is to be used, it deposits moisture mixed with a small amount of oil. This moisture is objectionable in pneumatic tools, sand blasting, paint spray work and similar operations. Much of the trouble with water in the air lines can be overcome if small receivers to act as collecting tanks are put in the lines at frequent intervals, otherwise suitable moisture traps should be used.

AIR RECEIVER - When possible locate the air receiver outside the building where it has an opportunity to radiate the most heat. A drain cock should be located at the lowest point in the receiver for drawing off at least once a day the accumulated oil and water. Where there is danger of freezing, the pressure relief valve should

Length of Inlet Line	Diameter of Pipe Size
0 to 10 Feet	Same As Compressor Inlet Opening
10 to 17 Feet	One Size Larger Than Inlet Opening
17 to 38 Feet	Two Sizes Larger Than Inlet Opening

FIGURE 1 - INLET LINE LENGTHS

be located on the inside wall, preferably with the compressor control equipment. All pressure relief valves should be tested daily by hand to be sure that they are functioning properly.

⚠ WARNING
ROTATION - the compressor must be run in the proper direction so that the fan will blow air over the compressor and for pump to operate. The motor leads must be connected to give the required direction of rotation.

“V” BELT DRIVE - The “V” belt drive consists of a rubber-fabric composition belt operating in a grooved pulley. Motor adjustment is provided to take up stretch of belt. The belt should be tensioned as described in any V-belt suppliers catalog. No belt dressing of any sort is required. Always install a new belt when belt becomes worn.

COVERS AND GUARDS

⚠ DANGER
To avoid personal injury or death from moving parts all compressor covers and guards must be securely fastened in their proper positions at all times when the compressor is operating. In addition, all moving parts on the entire compressor package, including but not limited to engine or motors, drive shafts, belts, pulleys, etc., must be equipped with guards or covers, which must also be securely fastened in proper position at all times when equipment is operating. Covers and guards are intended to not only protect against personal injury or death, but to also protect the equipment from damage from foreign objects.

STORAGE - After completing test of the compressor, a protective type oil to retard rust and corrosion is

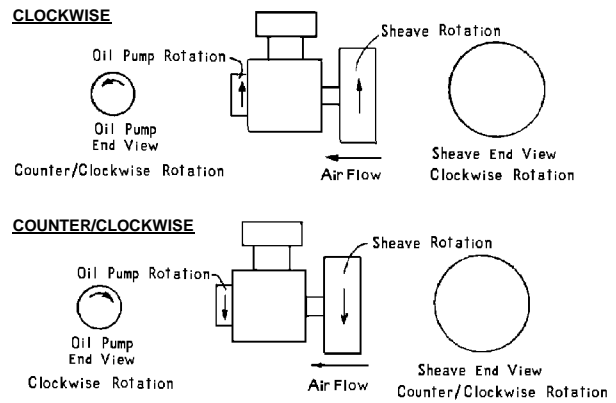


FIGURE 2 - ROTATION AS VIEWED FROM SHEAVE END

sprayed into the suction intake to protect interior of heads, valves and upper cylinder section. This is done with unit running.

This treatment gives the compressor sufficient protection against corrosion for approximately four months under average conditions. The protective oil in the unit need not be removed as it will mix with lubricating oils.

If a compressor is stored or not put into use for a period longer than four months, the following procedure is recommended:

Remove valves and handhole plates. Inspect the interior for signs of corrosion. Rotate the unit to inspect the cylinder walls. Use a protective type oil to retard corrosion and rust and spray inside the crankcase through the handhole plates. Spray cylinder bores. Spray valves and reassemble.

⚠ CAUTION
This protective oil spray treatment is only sufficient for a short period of time and should not be confused with long term storage.

PRESTART CHECK - (New or Overhauled Unit)

1. Check all bolts and nuts for tightness. Bolt torque specifications can be found in Parts List Manual.
2. Inspect air filter and air intake line for dirt and loose connections.
3. Service the air filter per instructions in “Air Filter,” page 5.

4. Check oil level - oil level must be above the red line on the sight gauge or to full mark on dipstick. New unit is supplied with break in oil in the crankcase.
5. Open the valve in the discharge line between the compressor and air receiver, where used.
6. Make sure proper pressure relief valve is between the compressor and any line shutoff valve, check valve or aftercooler.
7. Open the valve in the air line to unloading control, where used.
8. Check V-belt drive for alignment and proper tension.
9. Check compressor sheave for proper rotation.

On initial start or after the compressor has been overhauled, run the compressor with the receiver outlet valves wide open for about ten minutes so that oil will be distributed over all wearing surfaces. When sure that the unit is operating satisfactorily, partly close the receiver valve and gradually bring the pressure up to normal working pressure.

To ensure proper ring seating on a new or overhauled unit, run fully loaded for the first 40 hours.


COLD WEATHER STARTING - In addition to the normal starting procedure, make sure the weight of the oil in the crankcase is suitable for existing temperatures. Refer to "Lubrication" section, below. Start the unit under no load and stop before gaining full speed. Repeat this operation until pressure registers on the oil gauge or until oil has a chance to reach all moving parts.

After the unit is started, proceed as under normal starting.

LUBRICATION - Oil level in the crankcase must be maintained. Add oil as required to maintain the correct level. The viscosity required for various operating temperature ranges is listed in FIGURE 1, below.

The correct weight of oil for existing temperatures is most important. Oil which is too heavy cannot splash freely and will cause bearing damage and subsequent failure. Approximately 9 quarts of oil are required to fill the crankcase.

The oil level must be checked and maintained on a daily basis.

 CAUTION
<p>Break-in oil is supplied in the crankcase from the factory. Change oil and oil filter after 50 hours and refill the crankcase with lubricating oil. See FIGURE 1, below, for viscosity requirements.</p>

INITIAL STARTING - When starting for the first time, be certain that all items in the prestart have been complied with.

<p>Warm Weather Operation: 32° F to 90° F Ambient ISO Viscosity Grade 68*</p> <p>Warm Weather Operation: Above 90° F Ambient ISO Viscosity Grade 100**</p> <p>* ChampLub™ Case of 12 Quarts - Part Number P09479A 6 pack of 1 Gallon Containers - Part Number P08909A 5 Gallon Pail - Part Number P08908A 55 Gallon Drum - Part Number P08907A</p> <p style="padding-left: 20px;">Alternative Lubricant</p> <p>** ChampLub™ Synthetic Case of 12 Quarts - Part Number P13179A Case of 6, 1 Gallon - Part Number P13180A 5 Gallon Pail - Part Number P11506A 55 Gallon Drum - Part Number P13181A</p>
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FIGURE 1 - VISCOSITY REQUIREMENTS FOR VARIOUS TEMPERATURE RANGES

DAILY MAINTENANCE

DANGER

Before and during maintenance work be absolutely sure these rules are followed:

- A. Main electrical switch for motor driven units is off and marked so it cannot be accidentally turned on.
- B. Pressure in the air system is completely released.
- C. Never reach hand into the crankcase without being conscious of the fact that the crankshaft can rotate due to the position of the counterweights.
- D. Proper equipment and tools are used.

Failure to observe these precautions will result in injury or death.

1. Air filter – see “Air Filter,” page 5, for complete details.
2. Check oil pressure and level. Unit must be stopped for proper oil level check.
3. Listen to compressor valves for unusual noise, indicating worn or leaking valves.
4. Observe if control is normally loading and unloading unit (where used).
5. Drain condensate from air receiver, moisture traps and drop legs if used. Local humidity conditions will govern frequency condensate must be drained.
6. Inspect for air or oil leaks.
7. Check relief valve and intercooler relief valve (two stage units) by manual operation.

Although the compressor is designed for unattended operation, frequent inspection may reveal some malfunction and save serious damage.

MAINTENANCE

Compressor efficiency and life depend on the quality of maintenance the unit receives. Maintenance must be done regularly and with care. Clean work space, tools,

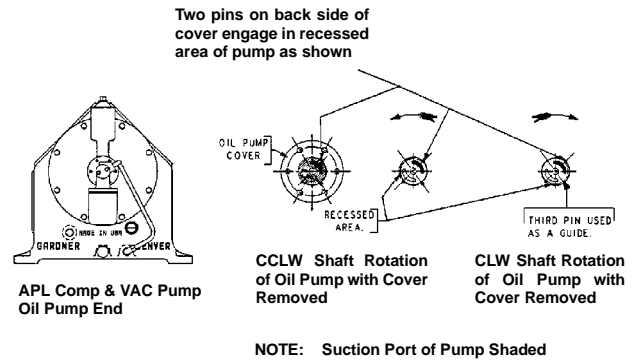


FIGURE 3 - OIL PUMP ROTATION

cleaning solvents and wiping rags are necessary to avoid transferring dirt into the unit. Clean the exterior of the unit before starting work to prevent dirt from entering the suction manifold, valve pockets, crankcase, etc. A maintenance chart listing the unit and scheduling regular maintenance is valuable. A good program well executed, is less costly than major repairs and down time.

WARNING

Oil pump rotation is preset. Refer to illustration to reverse operation.

LUBRICATING SYSTEM - All APL and APO models are equipped with a gear type oil pump driven by the crankshaft for pressure lubrication to the crankpin bearings. Oil pressure of 15 to 20 pounds is maintained with unit operating at maximum rated speed and operating temperature. Cylinders, piston pins and main bearings are spray lubricated.

RECOMMENDED LUBRICANTS - The recommended lubricant for these compressors is ChampLub™

Lubricant of the correct viscosity should be used for existing temperature ranges. Refer to FIGURE 1, page 3.

The correct weight of oil for existing temperatures is most important. Oil which is too heavy cannot be picked up by the oil pump or splash freely and will cause bearing damage and subsequent failure. For extreme cold weather operation it is very important that pour point of the oils is suitable for the existing temperatures and in some cases, heating the oil in the crankcase prior to starting the unit may be necessary.

 **DANGER**

Before and during maintenance work be absolutely sure these rules are followed:

- A. Main electrical switch for motor driven units is off and marked so it cannot be accidentally turned on.**
- B. Pressure in the air system is completely released.**
- C. Never reach hand into the crankcase without being conscious of the fact that the crankshaft can rotate due to the position of the counterweights.**
- D. Proper equipment and tools are used.**

Failure to observe these precautions will result in injury or death.

OIL CHANGE - When a new or overhauled unit is placed in service, the oil should be drained at the end of the first 50 hours operation and the crankcase thoroughly flushed with flushing oil. The oil should be changed again after the next 100 hours operation so that all polishing residue from working parts will be removed from the crankcase.

Subsequent oil change periods must be determined by checking the discoloration and physical condition of the oil in the crankcase. Due to dust, dirt and atmospheric conditions being different at various locations, it is not practical to definitely state how often the lubricating oil in the crankcase should be changed. Service given to air filter and crankcase breather also has a direct bearing on oil change interval, as does high humidity conditions which contribute to formation of varnish deposits through oxidation of the oil. The period for changing oil is therefore regulated by local conditions. The oil, however, should not be used for more than 500 hours. Oil filters should be changed every time the oil is changed.

Always provide clean containers, funnels and clean storage of oil and cleaning fluids. Changing oil will be of little benefit if done improperly.

Fill the crankcase through the opening on top of the crankcase until oil is to the dipstick FULL mark. Wipe

away all dirt before removing the oil filler plug. After the unit has operated for several minutes, shut down the compressor, check the oil level and add if necessary.

When starting the unit after an oil change, start under no-load until assured that oil has reached all moving parts.

Condensate accumulation in the crankcase will often occur as a result of high humidity conditions, wide temperature range and intermittent service.

CRANKCASE BREATHER - The crankcase breather should be washed each time the oil is changed. Inspect the element and replace if it shows signs of wear. Maintain the breather in first class repair to prevent dirt from entering the oil system.

AIR FILTER - Servicing the air filter is one of the most important maintenance operations to be performed to insure long compressor life. Study these instructions carefully and plan maintenance accordingly. Servicing frequency is dependent on the dirt and vapor content of the atmosphere, as well as type of filter used, and must be determined by the user. **Daily maintenance is not uncommon in extremely dusty conditions.** The best method is to service very frequently until a proper routine is established for existing conditions. In many cases filter service can be greatly reduced by a careful selection of location.

Not only is the timing of service important, but also **the manner in which it is done.** Service with care so parts are not damaged and be sure to assemble the filter correctly. Many air borne dirt particles and other materials are extremely abrasive and cause rapid wear or corrosion if allowed to enter the compressor. It is therefore important to use clean rags and cleaning fluids for cleaning, and to be sure dirt doesn't enter the compressor intake while the filter is off. Inspect the intake opening for dirt, and if found, determine the cause before continuing to operate the unit. Inspect flange connections, suction lines, hose connections, etc., for leaks. Make sure all filter gaskets and clamps are tight. **A small leak will offset the most rigid maintenance program.**

NOTICE

Never operate the compressor with a damaged filter or while servicing the filter.

Unless otherwise specified dry type filter silencers with replaceable elements are furnished. If other make or

type of filter is used, specific instructions for maintenance must be obtained from the manufacturer or Champion.

DRY TYPE FILTER SILENCER - Service every 1 to 30 days, as established for existing conditions:

1. Stop compressor and wipe dirt from exterior of filter.
2. Remove filter and disassemble. Clean cover and base.
3. Replace dirty filter element with a new element. See parts list for replacement element part number.
4. Reassemble filter on compressor.

NOTICE

While servicing filter, examine all parts for damage. Do not operate unit with damaged filter parts.

VALVES - The concentric valves are vital working parts of the compressor and must be inspected and cleaned at regular intervals. Factors regulating cleaning intervals are filter service, prevailing dust and atmospheric conditions, quality and carbon-forming tendency of oil used, and operating temperature.

Until experience indicates the proper cleaning interval, inspect and clean the valves every 1000 hours or every four months, whichever occurs first. If compressor output drops, valves become noisy or hot; stop the unit and inspect all valves. **DO NOT CONTINUE TO RUN THE UNIT, AS SERIOUS DAMAGE MAY RESULT.** Never operate the unit with a badly worn or broken valve part. Keep a supply of valve assemblies, valve parts and O-rings on hand to reduce down time.

One concentric suction and discharge valve is located in pockets in the head over each cylinder bore. Refer to parts list for sectional views of various type valve assemblies used in these machines. When disassembling the valves note the manner in which the various parts are arranged to assure proper assembly.

With a screwdriver inserted through the seat porting, check the disc action for free movement. When installing the valve assembly in the cylinder head use new seat and clamp O-rings. A small amount of grease will hold seat O-ring on valve while lowering into place. The nut holding the valve assembly together must go up, away from the piston. Refer to parts list for assembly views.

SUCTION VALVE UNLOADING MECHANISM - Unloading the compressor is accomplished by a plunger holding all suction valves off their seats when the predetermined air pressure, for which the unloading control is set, is reached. When air is applied above the plunger piston, the entire assembly moves as a unit until the valve is forced wide open against the bumper. When air is released by the control, a spring returns the plunger to its uppermost position allowing free action of the valves and loading of the compressor. Refer to parts list for assembly views.

DANGER

Never run the compressor with a valve that does not operate properly as a leaky valve will cause excessive temperatures and may cause an explosion in the air receiver or discharge line.

Clean and inspect all parts when the valves are serviced. Replace any weak or broken springs. Replace the "O"-ring on the unloader plunger when worn. The "O"-ring must be lubricated with a high-temperature "O"-ring grease.

PISTONS - When installing pistons in the cylinder make sure there are no burrs or dirt to affect running clearances.

PISTON RINGS - Piston rings must always be properly installed for proper break-in and controlled oil carry-over. Rings having a "pip" mark on one side near the ring gap must be installed and mark up towards the top of the piston; if rings are installed up-side-down, oil consumption will result. See parts list for piston ring arrangement.

Cleanliness precautions must be observed when assembling the parts to avoid possible scoring of the rings, piston and cylinder. Install the rings with care to avoid burrs and deep scratches. Oil the rings and cylinder wall during assembly. Stagger the ring gaps.

At the bottom of the cylinder is a large chamfer to aid the installation of the rings and piston in the cylinder. The suggested method of assembly is to have piston assembled to conn rod with piston pin. Center the rings on the piston as you guide piston into bottom of cylinder. With piston in cylinder, reassemble the cylinder to the crankcase and then assemble the conn rod to the crankshaft.

PISTON PIN BUSHINGS - The bronze piston pin bushings are a press fit in the piston and bored for proper running clearance with the pin. The suggested method for installing new bushings is to “freeze” the bushing in dry ice or cold storage box until it shrinks enough to slip in the bore. Using a press may damage the bushing.

After the bushings are installed, they must be bored for proper running clearance. The bushing bore must be square with piston so piston will run true in the cylinder. It is not recommended that the bushing be honed as grit will embed in the bushing, causing rapid wear of the parts.

PISTON PINS - Piston pins are clamped by the connecting rod for proper positioning. Make sure the clamp screw is torqued properly.

CRANKPIN BEARINGS - Crankpin bearings are of the renewable insert type. When installing new inserts the bore of the rod and the back of the insert must be absolutely free of dirt and burrs. Dirt or burrs under the insert will cause early insert failure. Where there is a possibility of bearing metal or dirt entering the oil passages of the conn-rod, the passages must be thoroughly cleaned before installing new inserts. Coat the crankpin with oil to prevent a dry start. The small projection on the insert must fit in the corresponding recess in the rod and cap. Do not file ends of inserts or rod caps. Assemble the rod and cap with cast timing marks on the same side. Tighten bolts evenly until proper torque is attained.



CAUTION

Do not torque each bolt to rating separately as this will cause the rod bore to deform to an out-of-round condition.

CRANKSHAFT OIL SEAL - The crankshaft oil seal must be installed with the lips of the seal facing in toward the oil side to retain oil in the crankcase. Double lip seals should be packed with grease between the lips.

“O”-RINGS AND GASKETS - All assembled joints are sealed with properly selected heat resistant “O”-rings except for the crankcase inspection plate and intercooler manifold joints which are sealed with gaskets. If it is necessary to break any of these joints, be sure that both metal surfaces are clean and smooth and use new “O”-rings or gaskets before reassembling. See the parts list for proper “O”-ring and gasket part numbers. “O”-rings must be lubricated with a suitable “O”-ring grease to ensure proper performance.

MAIN BEARINGS - Main bearings are Timken tapered roller type. They are correctly adjusted at the factory by means of shims between the bearing housing and the crankcase. Correct crankshaft end play is 0 to .001”.

VACUUM PUMPS - The instructions covering single-stage compressors may be applied to vacuum pumps as the construction of the compressors and vacuum pumps is identical.

TROUBLE SHOOTING

AIR PRESSURE SLOW TO BUILD UP:

1. Air filter clogged.
2. Leaks in air system.
3. Compressor too small
4. Worn suction or discharge valves - the valve cover feeling the hottest will indicate leaky valve.

Two stage compressor - check interstage pressure.

High interstage pressure - check H.P. Valves

Low interstage pressure - check L.P. valves

5. Broken unloader plunger spring - retards valve action.
6. Unloading plunger stuck.
7. Blown valve seat O-rings.
8. Worn piston rings.
9. Suction valve unloader plunger O-ring leaking.

UNIT WON'T UNLOAD:

1. Air to control shut off.
2. Control improperly wired.
3. Filter in control line clogged (where used).
4. Filter in pilot clogged (where used).
5. Unloader line leaking.
6. Control stuck - check for dirt or varnish.
7. Differential of pilot adjusted to jam valve piston (where used).
8. Control coil burned out.
9. Control pressure switch diaphragm ruptured.
10. O-ring on suction unloader plunger leaking.

NOISY VALVES:

1. Loose assembly.
2. Unloader spring broken.
3. Broken valve spring(s).
4. Weak valve spring(s).
5. Badly worn parts.

SHORT VALVE LIFE:

1. Dirt entering unit.
2. Heavy carbon deposits.
3. Corrosive vapors entering unit.
4. Uneven or worn valve seat.
5. Weak or collapsed valve spring(s).
6. Compressor over-speed.
7. Very rapid loading and unloading.
8. Broken unloader plunger spring.

COMMON CAUSES OF CONTROL MALFUNCTION:

1. Air line to control too small.
2. Dirt, moisture or varnish deposit.
3. Vibration.
4. Air leaks in control lines.
5. Line filters clogged (where used).
6. Pilot misadjustment (where used).
7. Pilot filter clogged (where used).
8. Seating faces of pilot parts nicked (where used).
9. Control improperly wired.
10. Pressure switch diaphragm ruptured.
11. Coil burned out.
12. Contact points burned.

LOW OIL PRESSURE:

1. Check pressure gauge.
2. Low on oil.
3. Clogged pump suction.
4. Clogged oil filter.
5. Worn inserts.
6. Worn oil pump.
7. Weak oil pump plunger spring.
8. Oil filter seal leaking.

STANDARD DIMENSIONS & RUNNING CLEARANCES

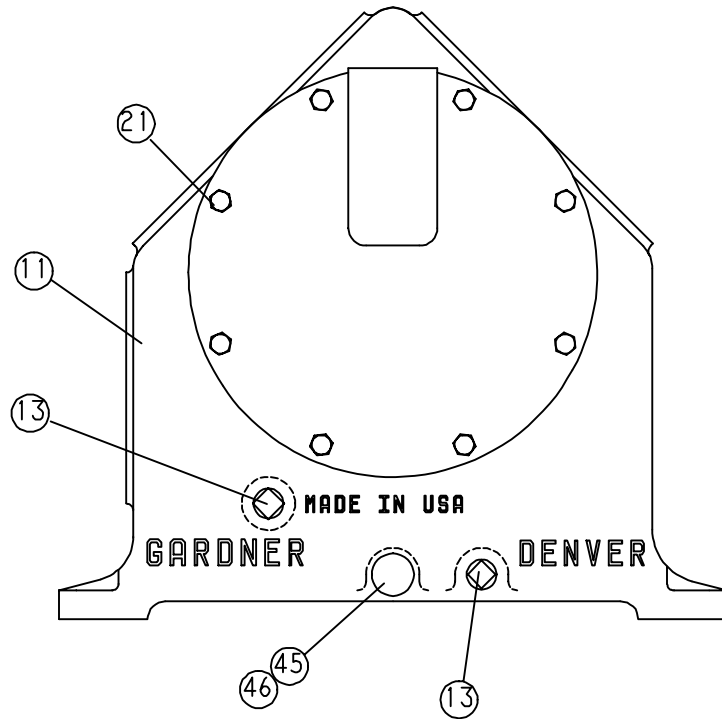
UNIT COLD - NEW COMPONENTS

	Inches	mm
CYLINDER BORE	7.875/7.876	200.025/200.050
PISTON - RING LAND DIAMETER	7.839/7.835	199.111/199.009
PISTON TO CYLINDER - AT RING LAND .....	.036/.041	.9144/1.0414
PISTON - SKIRT DIAMETER	7.8650/7.8640	199.771/199.746
PISTON TO CYLINDER - AT SKIRT .....	.0100/.0120	.254/.305
RING GAP - COMPRESSION .....	.010/.020	.254/.508
RING SIDE CLEARANCE - COMPRESSION .....	.0020/.0045	.051/.114
RING GAP - OIL .....	.010/.050	.254/1.270
RING SIDE CLEARANCE - OIL .....	.002/.008	.051/.203
PISTON - PIN BUSHING BORE	1.0095/1.0100	25.641/25.654
PISTON PIN DIAMETER	1.0082/1.0080	25.608/25.603
PISTON PIN TO BUSHING .....	.0013/.0020	.033/.051
CONNECTING ROD - CRANKPIN INSERT BORE .	2.750/2.749	69.850/69.825
CRANKSHAFT - CRANKPIN DIAMETER	2.6230/2.6225	66.624/66.612
INSERT THICKNESS .....	.06250/.06225	1.588/1.581
INSERT TO CRANKPIN .....	.001/.003	.0254/.0762
CONNECTING RODS SIDE CLEARANCE ON CRANKPIN .....	.010/.025	.254/.635
CRANKSHAFT DIAMETER - AT MAIN BEARING ..	2.5015/2.5025	63.538/63.564
MAIN BEARING I.D.	2.5000/2.5005	63.500/63.513
MAIN BEARING HOUSING BORE		
CRANKCASE	4.4355/4.4365	112.662/112.687
BEARING HOUSING	4.4355/4.4365	112.662/112.687
MAIN BEARING O.D.	4.4375/4.4385	112.713/112.738
CONNECTING ROD PISTON PIN BORE	1.010/1.008	25.654/25.603
MAIN BEARING END CLEARANCE	0 TO .001	0/.254

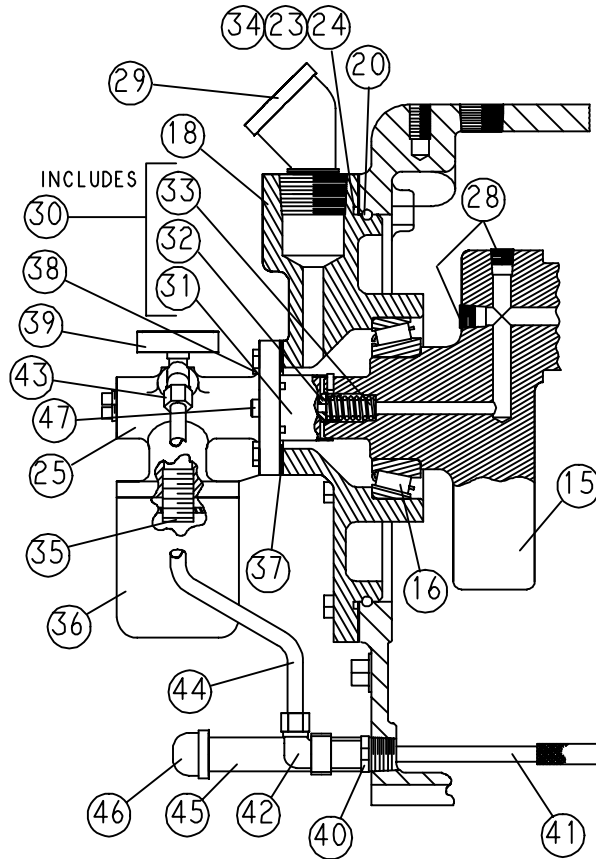
**TORQUE VALUES
(LUBRICATED)**

	Foot Pounds	Newton Meters
Bearing Housing To Crankcase Screws (3/8-16)	23 - 25	31 - 35
Oil Pump Filter Adaptor To Bearing Housing Screws (1/4-20)	6 - 7	8 - 9
Inspection Plate To Crankcase Screws (5/16-18)	13 - 15	17 - 20
Shroud Plate Screws (3/8-16)	23 - 25	31 - 35
Cylinder To Crankcase (1/2-13)	55 - 60	74 - 81
Sheave Nut (1-1/4-12)	500 - 550	678 - 746
Cylinder Head To Cylinder (1/2-13)	55 - 60	74 - 81
Valve Center Screw (1/2-13)	55 - 60	74 - 81
Valve Center Screw (5/16-18)	13 - 15	17 - 20
Connecting Rod - Crankpin Screws (1/2-13)	55 - 60	74 - 81
Connecting Rod - Piston Pin Screw (3/8-16)	23 - 25	31 - 35

CRANKCASE GROUP



200ASL810-K
(Ref. Drawing)

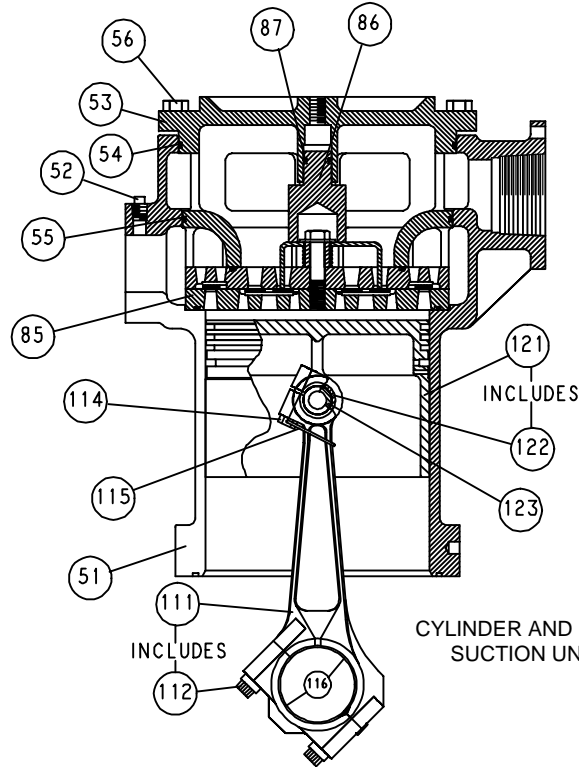


Order by Part Number and Description. Reference Numbers are for your convenience only.

CRANKCASE GROUP

Ref. No.	Name of Part	Qty.	Part No.
11	CRANKCASE	1	203ASL013
13	PLUG	1	64AA7
15	CRANKSHAFT - 3" Stroke	1	205ASL004
	CRANKSHAFT - 4-1/2" Stroke	1	204ASL004
16	BEARING-ROLLER	2	12C67
17	SEAL-OIL	1	60G262
18	HOUSING-BEARING	1	205ASL006
20	O-RING	1	25AH49
21	SCREW	8	655ED050
22	PIN-SPRING ROLL	1	62V33
23	SHIM-BEARING HOUSING .0075"	3	202ASL732
24	SHIM-BEARING HOUSING .005"	3	203ASL732
25	FILTER ADAPTOR ASSEMBLY	1	201ASL070
26	PIN-GROOVED	1	62V35
28	PLUG-SQHD	2	64AC2
29	ELBOW-PIPE	1	64X7
30	OIL PUMP KIT (Includes 31, 32 and 33)	1	200ASL188
31	PUMP-OIL	1	2010242
32	BUSHING-TRANSFER	1	2010244
33	SPRING	1	2010245
34	SHIM-BEARING HOUSING .020"	1	204ASL732
35	ADAPTOR-FILTER OIL	1	200ESF070
36	FILTER-OIL	1	26C28
37	SHIM SET	1	208ASL732
38	SCREW	4	75A186
39	GAUGE-PRESSURE	1	2009741
40	BUSHING-PIPE	1	2009296
41	SCREEN-OIL	1	200ADD019
42	ELBOW-TUBE	1	86E83
43	ELBOW-TUBE	1	86A86
44	TUBE	1	211ASL857
45	NIPPLE	1	63F8
46	CAP-PIPE	1	64AD4
47	SCREW	2	75LM222

Order by Part Number and Description. Reference Numbers are for your convenience only.



240ASL810-C
(Ref. Drawing)

CYLINDER AND HEAD SHOWN WITH
SUCTION UNLOADING VALVE

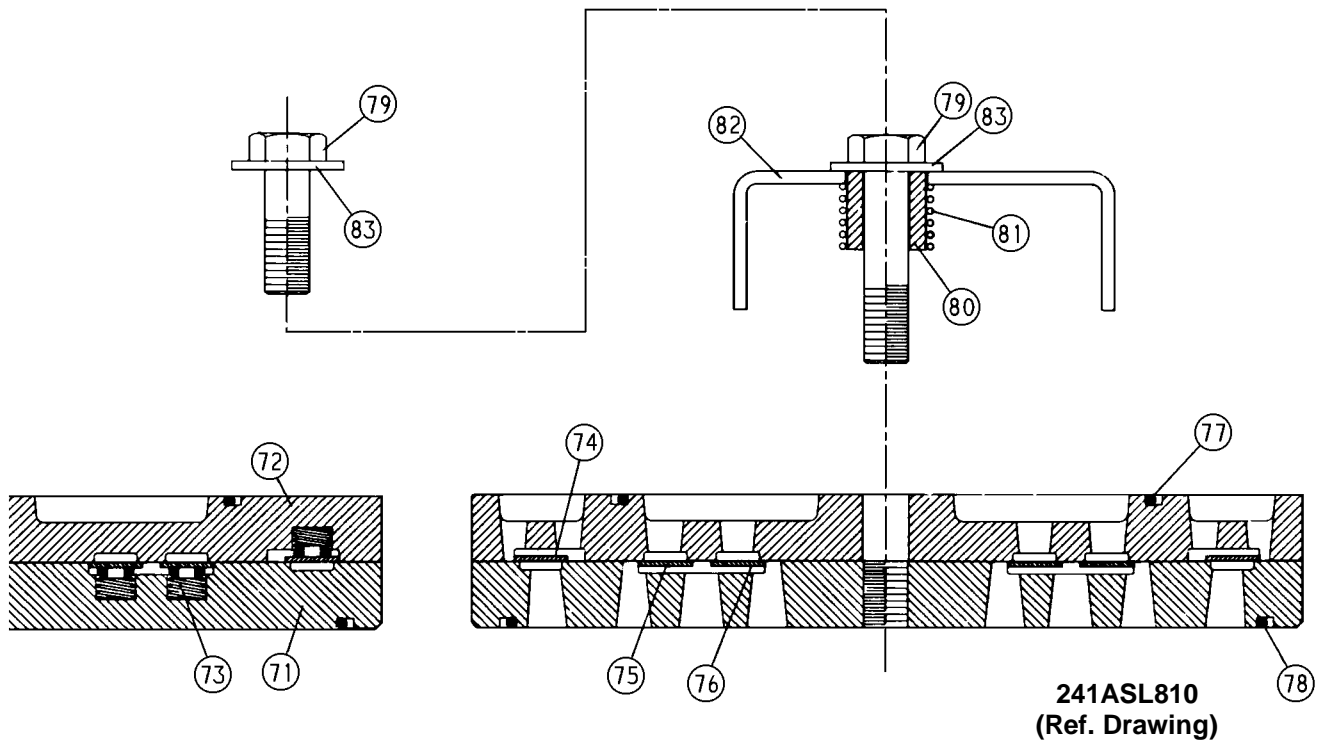
CYLINDER GROUP (2 Required Per Unit)

Ref. No.	Name of Part	Qty.	Part No.
51	CYLINDER	1	202ASL002
52	PLUG	1	64AA5
53	CYLINDER HEAD	1	207ASL007
54	O-RING	1	25BC422
55	O-RING	1	25BC433
56	SCREW	6	655EE060
85	VALVE 7-7/8"	1	See page 14
86	PLUNGER-UNLOADER, Used with Suction Valve Only	1	203ASL184
86	PLUG, Used with Plain Valve Only	1	64AA5
87	O-RING, Used with Suction Valve Only	1	25BC118
121	PISTON-AIR	1	204ASL015
122	BEARING SLEEVE-BRONZE	2	12BA135
123	PIN-PISTON	1	62F63
			3" Stroke 4-1/2" Stroke
	CONNECTING ROD KIT, Includes next four items	2	201ASL6001 202ASL6001
111	CONNECTING ROD	2	203ASL003 201ASL003
112	SCREW- 12 PT.	4	75LM195 75LM195
114	SCREW	2	655ED080 655ED080
116	BEARING-INSERT	4	200ADL174 200ADL174

Order by Part Number and Description. Reference Numbers are for your convenience only.

PLAIN VALVE

SUCTION UNLOADING VALVE

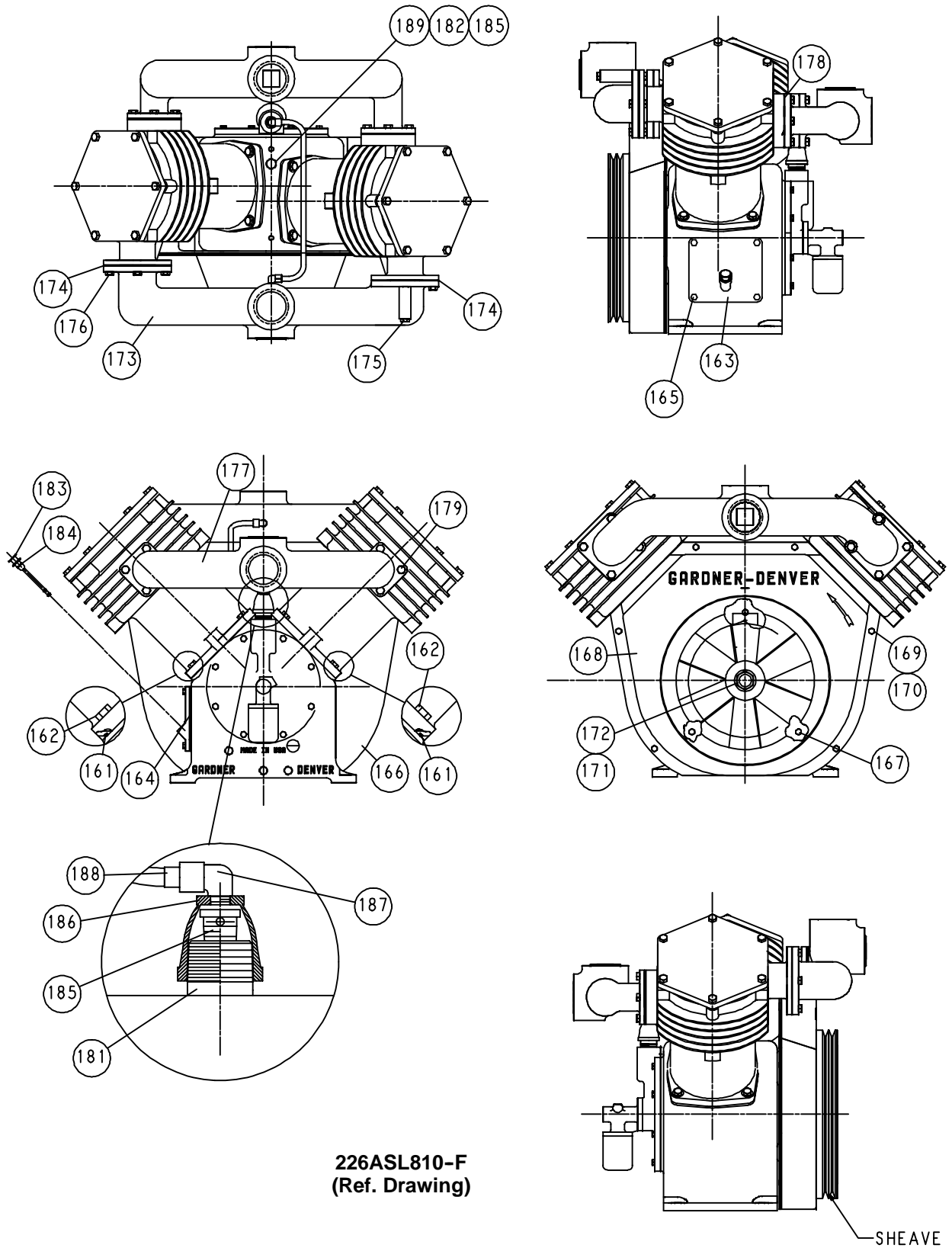


241ASL810
(Ref. Drawing)

VALVE GROUP
(2 Required per Unit)

Ref. No.	Name of Part	Qty	Suction Unloading Part No.	Plain Part No.
	VALVE ASSEMBLY (Includes Ref. No. 71-83)		212ASL529	210ASL529
71	SEAT-DISCHARGE VALVE	1	202WLA203	202WLA203
72	SEAT-SUCTION VALVE	1	200WLA202	200WLA202
73	SPRING-VALVE	17	202ASL105	202ASL105
74	VALVE-DISC	1	90V57	90V57
75	VALVE-DISC	1	90V56	90V56
76	VALVE-DISC	1	90V54	90V54
77	O-RING	1	25BC205	25BC205
78	O-RING	1	25BC110	25BC110
79	SCREW	1	655EE090	655EE060
80	SPACER	1	201VEG144	NONE
81	SPRING	1	78A174	NONE
82	FINGER-UNLOADER	1	202ASL183	NONE
83	WASHER	1	95F5	95F5

SINGLE STAGE COMPRESSOR/VACUUM PUMP



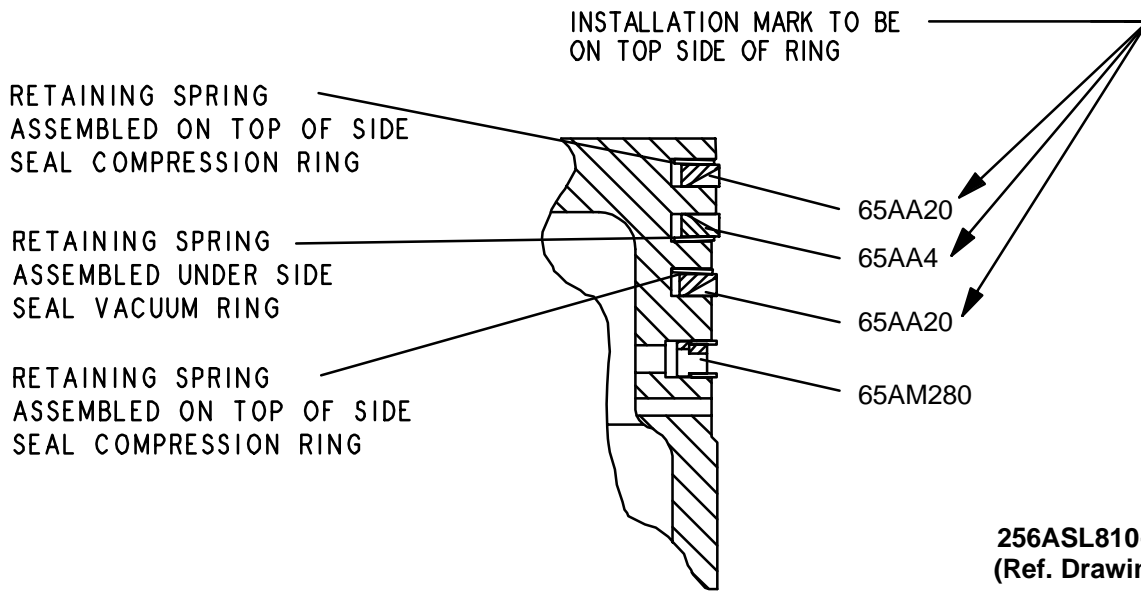
Order by Part Number and Description. Reference Numbers are for your convenience only.

SINGLE STAGE COMPRESSOR/VACUUM PUMP

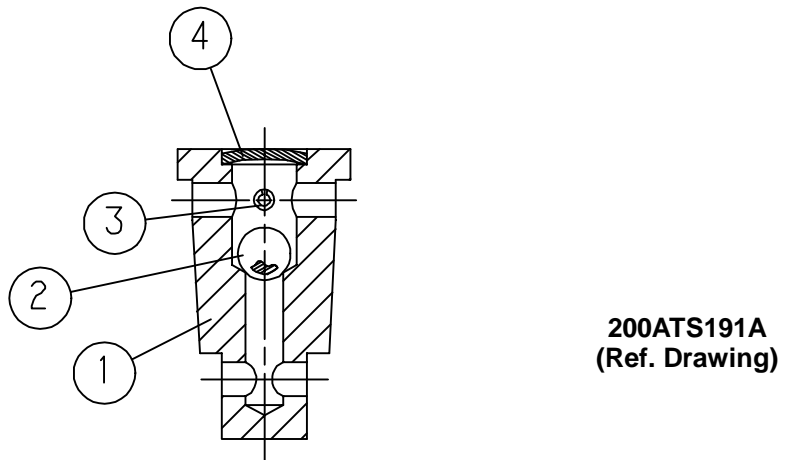
Ref. No.	Name of Part	Qty.	Part No.
161	O-RING	2	25BC425
162	SCREW	8	655EE060
163	PLATE-INSPECTION	1	201ASL052
164	GASKET-INSPECTION PLATE	1	204ATS715
165	SCREW	4	75A33
166	PLATE-SHROUD	1	202ASL247
167	SCREW	3	655ED020
168	SHROUD-FAN	1	202ASL647
169	SCREW-FLANGED HEAD	6	75LM51
170	NUT-FLANGED	6	50AW5
171	WASHER	1	95A11C
172	LOCKNUT	1	50V9
173	MANIFOLD-SUCTION	1	204ASL069
174	GASKET	2	25C1801N
175	SCREW	2	655EE180
176	SCREW	6	655EE050
177	MANIFOLD-DISCHARGE	1	202ASL071
178	GASKET	2	206WLA715
179	SCREW	8	655EE050
181	NIPPLE	1	202ASL126
182	REDUCER	1	64N25
183	DIPSTICK	1	201ASL491
184	O-RING	1	25AM18
185	BREATHER PLUG ASSEMBLY, See page 17	2	200ASL034
186	REDUCER-PIPE COUPLING	1	64N46
187	ELBOW-TUBE	2	86N215
188	TUBE	1	220ASL857
189	NIPPLE	1	63G4
	SHEAVE	1	300ASL099

Order by Part Number and Description. Reference Numbers are for your convenience only.

PISTON RING ARRANGEMENT

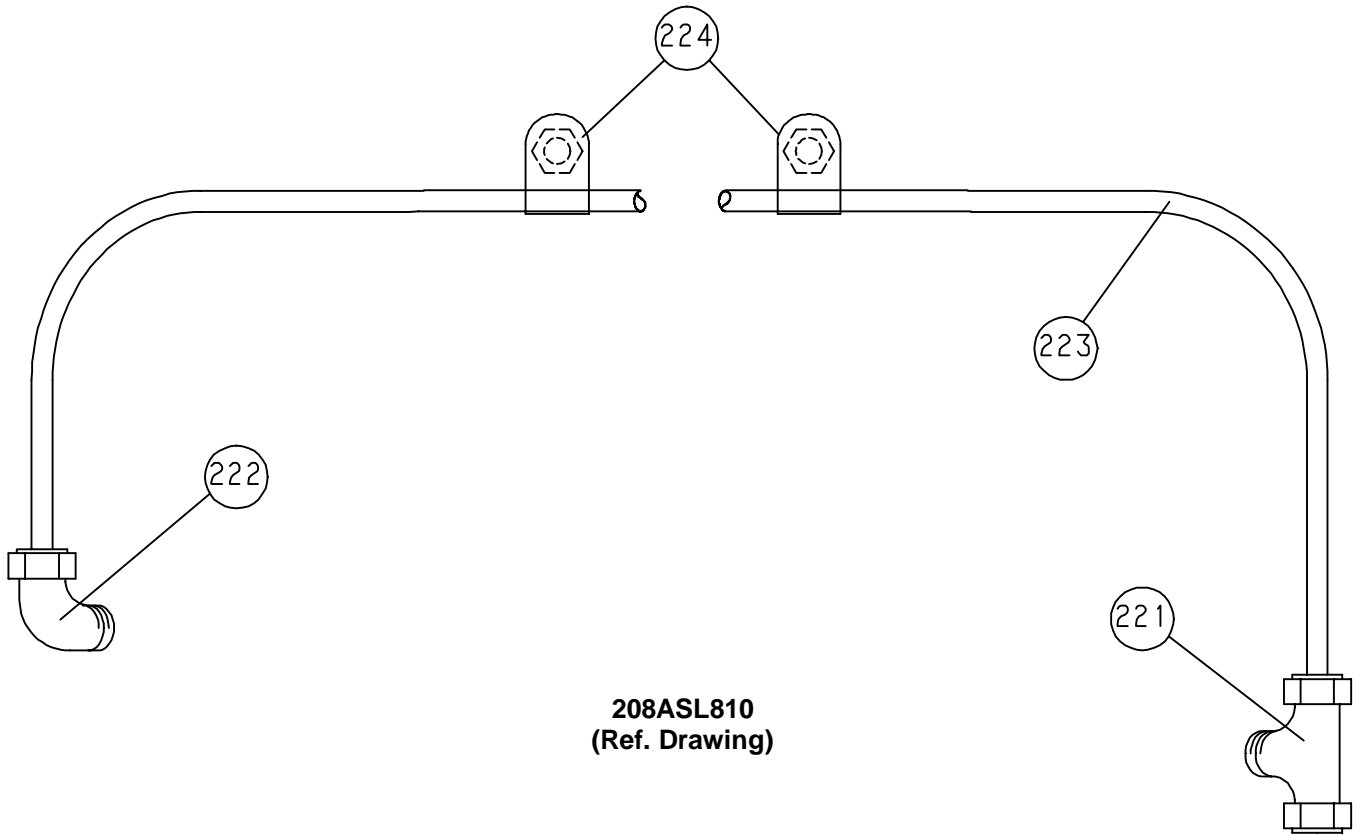


BREATHER PLUG ASSEMBLY



Ref. No.	Name of Part	Qty.	Part No.
	BREATHER PLUG ASSEMBLY, Includes next four items		200ASL034
1	BREATHER PLUG	1	200ASL191
2	BALL	1	10A6
3	PIN	1	62V17
4	EXPANSION PLUG	1	66A1

Order by Part Number and Description. Reference Numbers are for your convenience only.

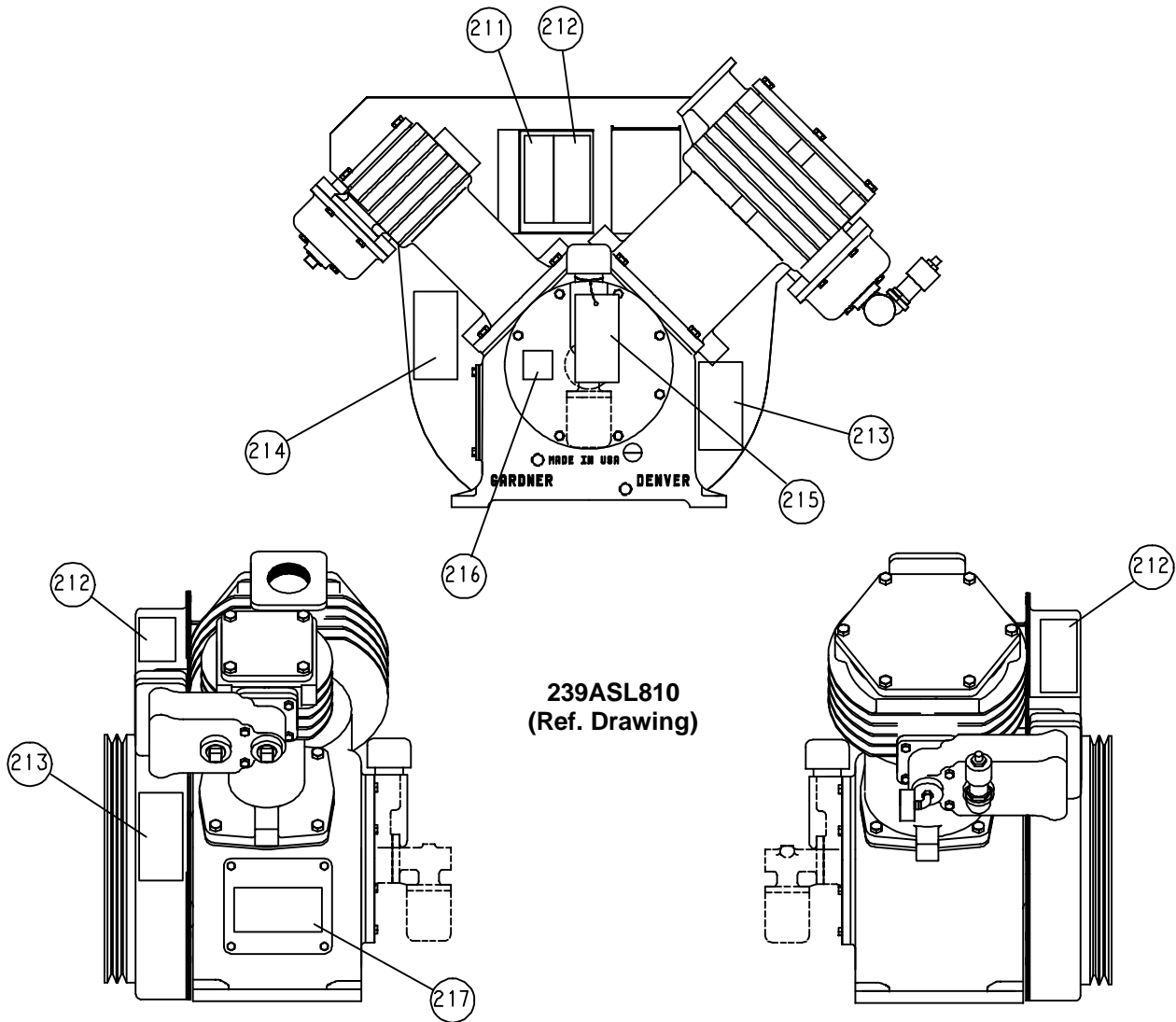


208ASL810
(Ref. Drawing)

UNLOADER PIPING

Ref. No.	Name of Part	Qty.	Part No.
221	TEE-TUBE	1	86E119
222	ELBOW-TUBE	1	86E60
223	TUBE	1	216ASL857
224	CLAMP	2	98A27

Order by Part Number and Description. Reference Numbers are for your convenience only.



DECALS

Ref. No.	Name of Part	Qty.	Part No.
211	DECAL-DANGER	1	206EAQ077
212	DECAL-DANGER	3	212EAQ077
213	DECAL-WARNING	2	200ASL077
214	DECAL-CAUTION	1	201ASL077
215	TAG-INSPECTION	1	200ATS304
216	DECAL - QUALITY	1	251EAQ077
217	NAMEPLATE	1	201ASL496
219	DECAL-ARROW	3	69F6

SPARE PARTS - REPAIR KITS

Ref. No.	Name of Part	Qty.	Part No.
	SUCTION UNLOADING VALVE KIT (7-7/8")		208ASL6017
	(Includes next five items)		
	O-RING	1	25BC422
	O-RING	1	25BC433
	VALVE-COMBINATION 7-7/8" SUCTION UNLOADING VALVE	1	212ASL529
	O-RING	1	25BC118
	O-RING	1	25BC100
	PLAIN VALVE KIT (7-7/8") (Includes next three items)		201ASL6017
	O-RING	1	25BC422
	O-RING	1	25BC433
	VALVE-COMBINATION 7-7/8" PLAIN VALVE	1	210ASL529
	SUCTION UNLOADING VALVE REBUILD KIT (7-7/8")		209ASL6017
	(Includes next thirteen items)		
	O-RING	1	25BC422
	O-RING	1	25BC433
	SPRING-VALVE ASSEMBLY	17	202ASL105
	DISC-VALVE	1	90V57
	DISC-VALVE	1	90V56
	DISC-VALVE	1	90V54
	O-RING	1	25BC205
	O-RING	1	25BC110
	SPRING	1	78A174
	FINGER-UNLOADER	1	202ASL183
	WASHER	1	95F5
	O-RING	1	25BC118
	O-RING	1	25BC100
	PLAIN VALVE REBUILD KIT (7-7/8")		205ASL6017
	(Includes next eight items)		
	O-RING	1	25BC422
	O-RING	1	25BC433
	SPRING-VALVE ASEMBLY	17	202ASL105
	DISC-VALVE	1	95V57
	DISC-VALVE	1	95V56
	DISC-VALVE	1	95V54
	O-RING	1	25BC205
	O-RING	1	25BC110

SPARE PARTS - REPAIR KITS (Continued)

Ref. No.	Name of Part	Qty.	Part No.
	GASKET KIT (7-7/8" & 7-7/8") (Includes next ten items)		ASL81706
	SEAL-OIL	1	60G262
	O-RING	1	25AH49
	SHIM 0075	3	202ASL732
	SHIM 0050	3	203ASL732
	SHIM	1	204ASL732
	SHIM	1	208ASL732
	O-RING	2	25BC425
	GASKET-INSPECTION PLATE	1	204ATS715
	GASKET SQUARE	2	25C1801N
	GASKET-FLANGE SQUARE	2	206WLA715
	CONNECTING ROD KIT (3" STROKE) (Includes next four items)		201ASL6001
	ROD-CONNECTING	1	203ASL003
	SCREW	2	75LM195
	SCREW	1	655ED080
	BEARING	2	200ADL174
	CONNECTING ROD KIT (4-1/2" STROKE) (Includes next four items)		202ASL6001
	ROD-CONNECTING	1	201ASL003
	SCREW	2	75LM195
	SCREW	1	655ED080
	BEARING	2	200ADL174
	PISTON RING KIT (7-7/8" COMPRESSION OR VACUUM)		202ASL6012
	(Includes next three items)		
	PISTON RING ASSEMBLY	1	65AM280
	PISTON RING ASSEMBLY	2	65AA20
	PISTON RING ASSEMBLY	1	65AA4
	OIL FILTER		26C28
	CYLINDER KIT (7-7/8") (Includes next six items)		200ASL6002
	CYLINDER 7-7/8"	1	202ASL002
	O-RING	1	25BC422
	O-RING	1	25BC433
	O-RING	1	25BC205
	O-RING	1	25BC110
	O-RING	1	25BC425



**WARRANTY
CHAMPION®
RECIPROCATING COMPRESSORS**

GENERAL PROVISIONS AND LIMITATIONS

Champion (the "Company") warrants to each original retail purchaser ("Purchaser") of its new products from the Company or its authorized distributor that such products are, at the time of delivery to the Purchaser, made with good material and workmanship. No warranty is made with respect to:

1. Any product which has been repaired or altered in such a way, in the Company's judgment, as to affect the product adversely.
2. Any product which has, in the Company's judgment been subject to negligence, accident, improper storage, or improper installation or application.
3. Any product which has not been operated or maintained in accordance with the recommendations of the Company.
4. Components or accessories manufactured, warranted and serviced by others.
5. Any reconditioned or prior owned product.

Claims for items described in (4) above should be submitted directly to the manufacturer.

WARRANTY PERIOD

The Company's obligation under this warranty is limited to repairing or, at its option, replacing, during normal business hours at an authorized service facility of the Company, any part which in its judgment proved not to be as warranted within the applicable Warranty Period as follows.

1. The power end is warranted for 24 months from date of start up, or 27 months from date of shipment to the Purchaser, whichever occurs first.
2. Expendable wear parts such as, but not limited to, rings, valves, packing and filters are warranted for material conformance and workmanship only. Normal wear or corrosion are specifically excluded. Nonconforming material must be identified to the Champion Factory Warranty Department within twelve months of machine startup or 15 months from date of shipment.
3. All other components are warranted for 12 months from date of startup or 15 months from date of shipment to the Purchaser, whichever occurs first.

Note: Deterioration or wear occasioned by chemical and/or abrasive action or excessive heat shall not constitute manufacturing defects.

LABOR TRANSPORTATION AND INSPECTION

The Company will provide labor, by Company representative or authorized service personnel, for repair or replacement of any product or part thereof which in the Company's judgment is proved not to be as warranted.

Labor shall be limited to the amount specified in the Company's labor rate schedule.

Labor costs in excess of the Company rate schedules caused by, but not limited to, location or inaccessibility of the equipment, or labor provided by unauthorized service personnel is not provided by this warranty.

All costs of transportation of product or parts claimed not to be as warranted and, of repaired or replacement parts to or from such service facility shall be borne by the Purchaser. The Company may require the return of any part claimed not to be as warranted to one of its facilities as designated by Company, transportation prepaid by Purchaser, to establish a claim under this warranty.

Replacement parts provided under the terms of the warranty are warranted for the remainder of the Warranty Period of the product upon which installed to the same extent as if such parts were original components.

WARRANTY REGISTRATION VALIDATION

A warranty registration form is provided with each machine. The form must be completed by the Purchaser and mailed within ten days after machine startup to validate the warranty.

DISCLAIMER

THE FOREGOING WARRANTY IS EXCLUSIVE AND IT IS EXPRESSLY AGREED THAT, EXCEPT AS TO TITLE, THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY.

THE REMEDY PROVIDED UNDER THIS WARRANTY SHALL BE THE SOLE, EXCLUSIVE AND ONLY REMEDY AVAILABLE TO PURCHASER AND IN NO CASE SHALL THE COMPANY BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES. UNDER NO CIRCUMSTANCES SHALL THE COMPANY BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOSSES OR DELAYS HOWSOEVER CAUSED.

No statement, representation, agreement, or understanding, oral or written, made by any agent, distributor, representative, or employee of the Company which is not contained in this Warranty will be binding upon the Company unless made in writing and executed by an officer of the Company.

This warranty shall not be effective as to any claim which is not presented within 30 days after the date upon which the product is claimed not to have been as warranted. Any action for breach of this warranty must be commenced within one year after the date upon which the cause of action occurred.

Any adjustment made pursuant to this warranty shall not be construed as an admission by the Company that any product was not as warranted.



For additional information contact your local representative or
Princeton, Customer Service Department,
1301 N. Euclid Ave., Princeton, Illinois 61356
Telephone: (815) 875-3321 FAX: (815) 872-0421

Sales and Service in all major cities.

For parts information, contact
Master Distribution Center, Memphis, TN
Telephone: (800) 245-4946 FAX: (901) 542-6159

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