OPERATION

AND

MAINTENANCE

MANUAL

# UNIT TYPE AIR COMPRESSORS

## SERIES 20 THROUGH 80 — SINGLE STAGE

## SERIES 100 THROUGH 900 — TWO STAGE

## SERIES 440A THROUGH 990A — TWO STAGE

## AIR COMPRESSORS



LeRoi DRESSER

LeRoi Division,
Dresser Industries, Inc.
Sidney, Ohio 45365

# WARRANTY

## RECIPROCATING UNIT AIR COMPRESSORS

## WARRANTY AND LIMITATION OF REMEDY AND LIABILITY

A. Seller warrants only that its products, when shipped, and its work, when performed, will meet all applicable specifications, and other specific product and work requirements (including those of performance), if any, of this agreement and will be free from defects in material and workmanship. All claims under this warranty must be made in writing immediately upon discovery and, in any event, within the following times:

Reciprocating unit air compressors of Seller's manufacture — eighteen (18) months from date of shipment to Buyer, or one (1) year from date of initial operation, whichever occurs first. Reciprocating unit air compressors include, but are not limited to:

- Two stage compressors, electric motor and engine driven
- Two stage basic compressors (pumps only)
- Single stage compressors, electric motor driven
- Single stage basic compressors (pumps only)
- Air receivers for reciprocating unit air compressors
- Accessories and parts for any of the above

The foregoing warranty applies only to products manufactured by the Seller. It does not include components or parts purchased by the Seller from other suppliers, and as to the latter, the warranties of the suppliers of the components or parts shall be applicable.

Defective and nonconforming items must be held for Seller's inspection and returned to the original f.o.b. point upon request. THE FOREGOING IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESS, IMPLIED AND STATUTORY, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS.

B. Upon Buyer's submission of a claim as provided above and its substantiation, Seller shall at its option either (i) repair or replace its product or work at the original f.o.b. point or (ii) refund an equitable portion of the purchase price.

C. THE FOREGOING IS SELLER'S ONLY OBLIGATION AND BUYER'S EXCLUSIVE REMEDY FOR BREACH OF WARRANTY AND EXCEPT FOR GROSS NEGLIGENCE, WILLFUL MISCONDUCT AND REMEDIES PERMITTED UNDER THE PERFORMANCE, INSPECTION AND ACCEPTANCE AND THE PATENTS CLAUSES HEREOF, THE FOREGOING IS BUYER'S EXCLUSIVE REMEDY AGAINST SELLER FOR ALL CLAIMS ARISING HEREUNDER OR RELATING HERETO WHETHER SUCH CLAIMS ARE BASED ON BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR OTHER THEORIES. BUYER'S FAILURE TO SUBMIT A CLAIM AS PROVIDED ABOVE SHALL SPECIFICALLY WAIVE ALL CLAIMS FOR DAMAGES OR OTHER RELIEF, INCLUDING BUT NOT LIMITED TO CLAIMS BASED ON LATENT DEFECTS. IN NO EVENT SHALL BUYER BE ENTITLED TO INCIDENTAL OR CONSEQUENTIAL DAMAGES. ANY ACTION BY BUYER ARISING HEREUNDER OR RELATING HERETO, WHETHER BASED ON BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR OTHER THEORIES, MUST BE COMMENCED WITHIN ONE (1) YEAR AFTER THE CAUSE OF ACTION ACCRUES OR IT SHALL BE BARRED.

Le ROI DRESSER

LeROI DIVISION, DRESSER INDUSTRIES, INC., SIDNEY, OHIO 45365

**WARNING**

DO NOT OPERATE THESE COMPRESSORS AT SPEEDS BELOW 400 R.P.M.

WHEN INSTALLING A COMPRESSOR THAT IS TO BE POWERED BY AN ELECTRIC MOTOR, BE SURE THAT ALL WIRING IS MADE BY A LICENSED ELECTRICIAN AND THAT THE INSTALLATION MEETS *ALL APPLICABLE CODES* INCLUDING THOSE OF LOCAL ORIGIN.

WHEN A COMPRESSOR IS TO BE POWERED BY AN ENGINE OR POWER TAKE-OFF DEVICE, BE SURE THAT INSTALLATION IS MADE BY A HIGHLY QUALIFIED MECHANIC AND THAT ALL SAFETY CODES ARE MET IN THE INSTALLATION.

# INSTALLATION

## 1. INSTALLATION

When installing series 100-900 and 20-80 air compressors on existing installations as replacement compressors or on new installations, either bedplate or receiver mounted, air connections must be made as shown in figures 1 and 2.

Figure 1 is for start-stop operation only. Note the orifice located in the bottom port of the air control valve.

Figure 2 is for load-unload (continuous run) or dual (combination start-stop or load-unload) operation.

Connections must be made as shown to insure proper operation of the air control valve.

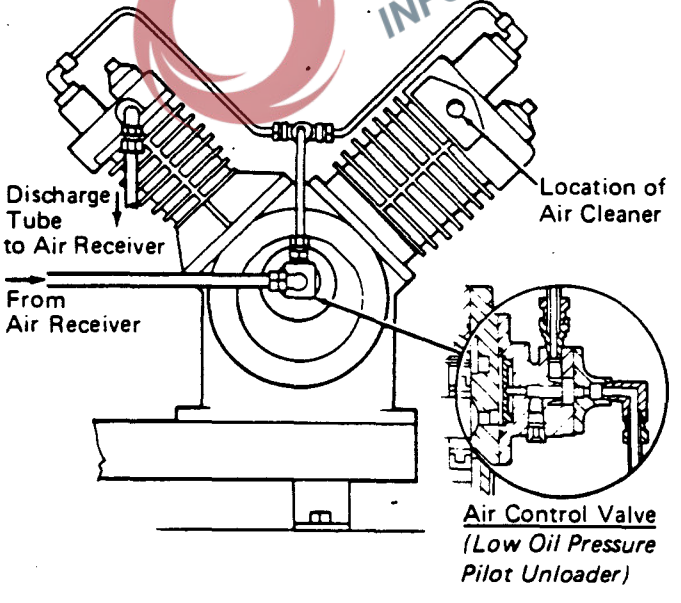
## 2. SAFETY

The air control valve is a safety device which prevents the compressor from pumping to rated pressure in the event the compressor oil pump does not provide adequate lubricating oil pressure.

**CAUTION**

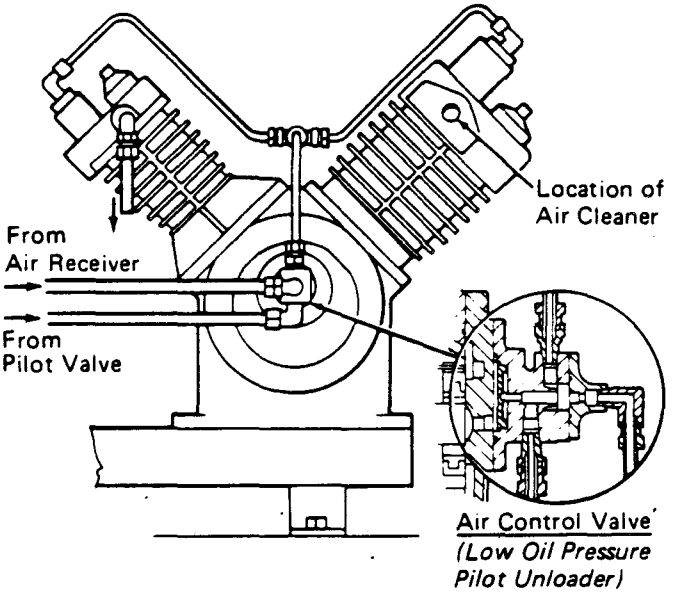
MAKE CERTAIN THE AIR RECEIVER OR STORAGE TANK WHICH IS CONNECTED TO THE COMPRESSOR HAS A SAFETY VALVE, OF ADEQUATE SIZE, CORRECTLY INSTALLED.

MANUALLY OPERATE THE SAFETY VALVE TO INSURE PROPER OPERATION.




START-STOP

*Figure 1*




LOAD-UNLOAD OR DUAL CONTROL

*Figure 2*

# OPERATION

### 1. Lubrication

Prior to initial operation, fill the crankcase with a single viscosity, non-detergent super refined oil with rust and oxidation inhibitor. Oil should be either a naphthenic base or a specially compounded type to minimize carbon formation and to produce carbon residue of a soft, fluffy nature. Oils having animal fat compounding are NOT recommended.

| | |
|---|---|
| Above 32°F | SAE 20 |
| 0°F to 32°F | SAE 10W |
| Below 0 F | Auxiliary crankcase oil heaters are recommended |

**NOTE:** For cold weather operation the lubricating oil should have a pour point of 20°F below the coldest expected operating temperature.

**CAUTION:** Do not use detergent oils.

| SERIES | CAPACITY |
|---|---|
| 20-100-200 | 7/8 qt. |
| 40-300-400 | 1-1/8 qt. |
| 60-500-600 | 2-1/2 qt. |
| 80-700-800 | 4-1/2 qt. |
| 900 | 4-1/2 qt. |

### 2. Starting

a. Perform all scheduled preventive maintenance services as specified.

b. If a shutoff valve is used in the compressor-to-receiver discharge line, open the valve.

**CAUTION:** (SHUTOFF VALVES ARE NOT TO BE INSTALLED IN THIS LINE UNLESS A SAFETY VALVE IS LOCATED BETWEEN IT AND THE COMPRESSOR.)

### 3. Operation

As the compressor starts, check the rotation of the unit. Normal rotation is clockwise, viewing the compressor from the oil pump end. A rotation arrow, is placed on the oil pump cover at the factory. Should the rotation be incorrect, disengage the power supply and check the motor wiring.

After the compressor is started, it will operate automatically with any of the three types of controls.

**NOTE:** The compressor can be operated with "reverse rotation" by changing the unit as outlined in paragraph 6.

### 4. Stopping

a. Disconnect the power supply.

b. Open the air valve.

# PREVENTIVE MAINTENANCE

The operation of your pneumatic system is dependent on this air compressor. The long trouble free life designed in each compressor will be assured when the few simple procedures listed below are followed.

### 1. Daily

Prior to initial operation, fill the crankcase with a single viscosity, non-detergent super refined oil with rust and oxidation inhibitor. Oil should be either a naphthenic base or a specially compounded type to minimize carbon formation and to produce carbon residue of a soft, fluffy nature. Oils having animal fat compounding are NOT recommended.

| | |
|---|---|
| Above 32°F | SAE 20 |
| 0°F to 32°F | SAE 10W |
| Below 0°F | Auxiliary crankcase oil heaters are recommended. |

**CAUTION:** Do not use detergent oils.

**NOTE:** For cold weather operation the lubricating oil should have a pour point at least 20°F lower than the coldest expected operating temperature.

a. Open draincock located in bottom of reservoir to drain condensate.

b. At end of each day's operation, disconnect power supply.

**2. Weekly**

**With Power Supply Disengaged**

a. Clean complete compressor and reservoir. Clean intercooler fins with compressed air.

**NOTE**

**Series 700, 800, and 900**

Proper dirt removal or cleanliness at flywheel side of intercooler can be determined with a suitable light source such as a flashlight. Intercoolers on these models are of the horseshoe design and can clog up externally from the fan side yet appear clean from casual inspection.

b. Clean air intake filter in accordance with the filter decal.

c. Check drive belts and adjust if necessary.

**3. Monthly or 300 Hours Service**

**With Power Supply Diesengaged**

a. Repeat weekly procedures.

b. Change compressor oil. Use as listed in paragraph 1.

c. Check for and correct air and oil leaks.

d. Tighten all hardware.

**4. Six Months To One Year**

**With Power Supply Disengaged**

a. Remove, clean and inspect compressor valves.

b. Repack suction valve unloader assemblies.

**5. Preventive Maintenance For Heavy Duty Service**

**NOTE:** Heavy duty service is whenever a compressor is operated continuously in excess of eight hours per calendar day.

a. DAILY. Check oil level. Add oil to bring up to level mark if indicator shows it to be low. Open drain cock at bottom of reservoir and drain condensate.

b. WEEKLY. Check complete compressor and reservoir. Clean out intercooler fins with compressed air. Clean drive belts and adjust if necessary.

c. EVERY 500 HOURS. Change crankcase oil.

d. EVERY 1000 HOURS. Install complete set of new or rebuilt valves. Repack suction valve unloader assemblies with silicone grease. Replace suction valve unloader "O" rings and felts if necessary.

**6. Oil Pump — Reversing Rotation** (See Figure 3)

Normal rotation of the oil pump is clockwise when viewing the compressor from the oil pump end. Should "reverse or counterclockwise rotation" be desired, proceed as follows:

a. Disconnect the air receiver tubing, and the unloader tubing.

b. Remove the screws that secure the oil pump cover to the crankcase and remove the cover.

c. Remove the oil pump rotor, vanes, and springs.

d. Remove the oil pump insert from the pin; turn the insert over so the arrow on the other side points counterclockwise; and reinstall insert over the pin.

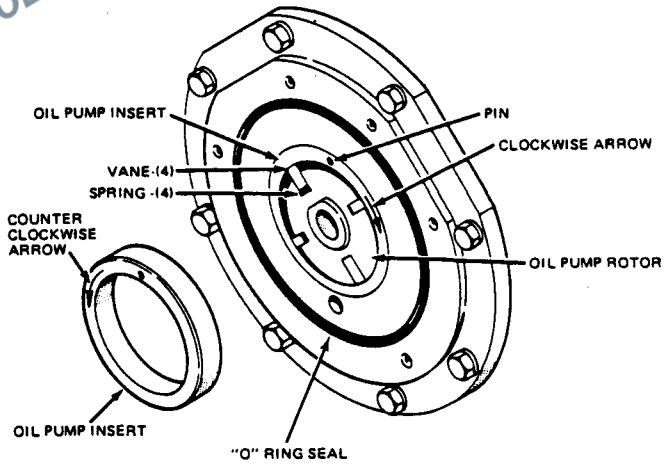
e. Install the rotor, springs, and vanes.

f. Replace the oil pump cover and secure with the screws.

**NOTE:** When changing the rotation of 80, 700 800, 900 Series it will require installation of the correct fan and/or flywheel to insure proper cooling of the compressor. All other models use same flywheel for either rotation.

g. On units with unloaders, attach the unloader tubing air receiver tubing, and (if used) the pilot valve tubing.

h. Be certain the drive motor now turns the compressor counterclockwise.



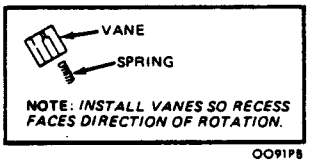




*Figure 3*

## CLEARANCE – TOLERANCE – TORQUE

| MODEL | 20 | 40 | 60<br>66A | 80<br>88A | 99A | 100<br>200 | 300 | 400<br>440A | 500<br>550A | 600<br>660A | 700<br>770A | 800<br>880A | 900<br>990A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Piston Clearances:** | | | | | | | | | | | | | |
| H. P. at Skirt | | | | | | .002/.0035 | .002/.0035 | .002/.0035 | .002/.0035 | .003/.005 | .0055/.0075 | .0045/.0075 | .0045/.0075 |
| L. P. at Skirt | .0025/.0045 | .0035/.0055 | .0055/.0075 | .0055/.0075 | .0055/.0075 | .0025/.0045 | .0035/.0055 | .0035/.0055 | .0045/.0065 | .0055/.0075 | .0045/.0065 | .0055/.0075 | .0055/.0075 |
| **Piston Ring End Clearance** | | | | | | | | | | | | | |
| H. P. Compression | | | | | | .005/.013 | .007/.015 | .007/.017 | .007/.017 | .010/.020 | .010/.020 | .013/.023 | .013/.023 |
| L. P. Compression | .010/.020 | .013/.023 | .017/.027 | .017/.027 | .017/.027 | .010/.020 | .013/.023 | .013/.023 | .017/.027 | .017/.027 | .017/.027 | .017/.027 | .017/.027 |
| H. P. Oil | | | | | | .005/.013 | .007/.015 | .007/.015 | .007/.015 | .010/.018 | .010/.018 | .013/.023 | .013/.023 |
| L. P. Oil | .010/.020 | .013/.025 | .017/.027 | .017/.027 | .017/.027 | .010/.020 | .013/.025 | .013/.023 | .017/.027 | .017/.027 | .017/.027 | .017/.027 | .017/.027 |
| **Piston Ring Groove Clearance** | | | | | | | | | | | | | |
| H. P. Compression Ring | | | | | | .002/.0035 | .002/.0035 | .002/.0035 | .002/.0035 | .002/.0035 | .002/.0035 | .002/.0035 | .002/.0035 |
| H. P. Oil Control Ring | | | | | | .0015/.003 | .0015/.003 | .0015/.003 | .0015/.003 | .0015/.003 | .0015/.003 | .0015/.003 | .0015/.003 |
| L. P. Compression Ring | .002/.0035 | .002/.0035 | .0025/.0045 | .0025/.0045 | .0025/.0045 | .002/.0035 | .002/.0035 | .002/.0035 | .0025/.0045 | .0025/.0045 | .0025/.0045 | .0025/.0045 | .0025/.0045 |
| L. P. Oil Control Ring | .0015/.003 | .0015/.003 | .002/.004 | .002/.004 | .002/.004 | .0015/.003 | .0015/.003 | .0015/.003 | .002/.004 | .002/.004 | .002/.004 | .002/.004 | .002/.004 |
| Top of Piston to Top of Cylinder Clearance | -.005+.018 | -.003+.020 | -.003+.025 | -.001+.022 | -.006+.026 | -.005+.018 | -.004+.019 | -.003+.020 | -.001+.022 | -.003+.025 | -.001+.022 | -.001+.022 | -.006+.026 |
| Connecting Rod Bearing Running Clearance | .0025/.0044 | .0025/.0044 | .0025/.0044 | .0025/.0044 | .0025/.0044 | .0025/.0044 | .0025/.0044 | .0025/.0044 | .0025/.0044 | .0025/.0044 | .0025/.0044 | .0025/.0044 | .0025/.0044 |
| Crankshaft End Play | .003/.005 | .003/.005 | .003/.005 | .003/.005 | .003/.005 | .003/.005 | .003/.005 | .003/.005 | .003/.005 | .003/.005 | .003/.005 | .003/.005 | .003/.005 |
| Oil Pump Rotor End Clearance | .0015/.0035 | .0015/.0035 | .0015/.0035 | .0015/.0035 | .0015/.0035 | .0015/.0035 | .0015/.0035 | .0015/.0035 | .0015/.0035 | .0015/.0035 | .0015/.0035 | .0015/.0035 | .0015/.0035 |
| **TORQUE DATA** | | | | | | | | | | | | | |
| **Valve Nut** | | | | | | | | | | | | | |
| H. P. | | | | | | 150 In. Lbs. | 150 In. Lbs. | 150 In. Lbs. | 150 In. Lbs. | 150 In. Lbs. | 200 In. Lbs. | 200 In. Lbs. | 200 In. Lbs. |
| L. P. | 110 In. Lbs. | 132 In. Lbs. | 132 In. Lbs. | 132 In. Lbs. | 200 In. Lbs. | 150 In. Lbs. | 150 In. Lbs. | 200 In. Lbs. | 200 In. Lbs. | 200 In. Lbs. | 200 In. Lbs. | 200 In. Lbs. | 200 In. Lbs. |
| Connecting Rod Bolts | 120 In. Lbs. | 150 In. Lbs. | 350 In. Lbs. | 350 In. Lbs. | 175 Ft. Lbs. | 120 In. Lbs. | 150 In. Lbs. | 150 In. Lbs. | 350 In. Lbs. | 350 In. Lbs. | 350 In. Lbs. | 350 In. Lbs. | 175 Ft. Lbs. |
| Piston Pin Bolt | | | | | 79 Ft. Lbs. | | | | | | | | 79 Ft. Lbs. |
| **Valve Plug or Unloader Sleeve** | | | | | | | | | | | | | |
| L. P. | 100 Ft. Lbs. | 100 Ft. Lbs. | 200 Ft. Lbs. | 200 Ft. Lbs. | 200 Ft. Lbs. | 100 Ft. Lbs. | 100 Ft. Lbs. | 100 Ft. Lbs. | 100 Ft. Lbs. | 200 Ft. Lbs. | 100 Ft. Lbs. | 200 Ft. Lbs. | 200 Ft. Lbs. |
| H. P. | | | | | | 70 Ft. Lbs. | 70 Ft. Lbs. | 70 Ft. Lbs. | 70 Ft. Lbs. | 70 Ft. Lbs. | 100 Ft. Lbs. | 100 Ft. Lbs. | 100 Ft. Lbs. |
| Flywheel Retainer Bolt | 47 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. | 250 Ft. Lbs. | 250 Ft. Lbs. | 47 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. | 250 Ft. Lbs. | 250 Ft. Lbs. | 250 Ft. Lbs. |
| Cylinder Flange Bolts | 47 Ft. Lbs. | 73 Ft. Lbs. | 142 Ft. Lbs. | 142 Ft. Lbs. | 142 Ft. Lbs. | 47 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. | 142 Ft. Lbs. | 142 Ft. Lbs. | 142 Ft. Lbs. | 142 Ft. Lbs. | 142 Ft. Lbs. |
| Cylinder Head Bolts L. P. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. |
| Cylinder Head Bolts H. P. | | | | | | | | 73 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. | 73 Ft. Lbs. |
| Oil Pump Cover Bolts | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. | 8.8 Ft. Lbs. |
| Rear Retainer Bolts | | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. | 29.7 Ft. Lbs. |

NOTE: CLEARANCES AND TOLERANCES ARE IN INCHES.