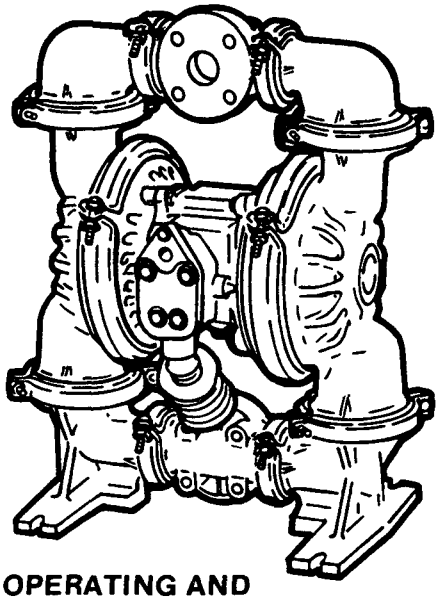
LINCOLN
A PENTAIR COMPANY

Model Nos. 84860, 84861
1½" AIR-POWERED DIAPHRAGM PUMP
Series "A"

OPERATING INSTRUCTIONS, SERVICE MANUAL AND REPAIR PARTS LIST



OPERATING AND SERVICE INSTRUCTIONS

⚠ CAUTION

Hydrofluouric acid above 40% concentrate should not be pumped with this unit. Check chemical compatibility chart for other fluids.

⚠ CAUTION

Maximum Operating Pressure, 100 PSI (7 Bar.) and Safe Operating Temperatures of 150°F. (66°C.) Maximum and 40°F. (4.4°C.) Minimum are based upon mechanical stress only and may be significantly altered by pumping certain chemicals. Consult engineering guides for chemical compatibilities and temperature limits.

⚠ WARNING

Do not use for pumping flammable materials. Build up and discharge of static electricity may result in a fire and/or explosion causing personal injury and loss to property.

Principle of Operation

The pump is powered by compressed air which alternately pressurizes the inner sides of the two diaphragm chambers while simultaneously exhausting the opposite inner chambers causing the diaphragms, which are connected by a shaft, to move endwise. Since air pressure is applied over the entire surface of the diaphragm which is forcing liquid to be discharged by its other side, the diaphragm is operating under a balanced condition during the discharge stroke.

Alternate pressurizing and exhausting of the diaphragm chamber is performed by an externally mounted, pilot-operated, four way, spool type air distribution valve. When the spool is at one end of the valve body, inlet air pressure is connected to one diaphragm chamber and the other diaphragm chamber is connected to the exhaust. When the spool is moved to the opposite end of the valve body, the porting of chambers is reversed. The air distribution valve spool is moved from one end position to the other in the valve body by means of an internal pilot valve which alternately pressurizes the ends of the air distribution valve spool while simultaneously exhausting the other ends. The pilot valve is positively shifted at each end of the diaphragm stroke by the diaphragm plate's coming in contact with the end of the pilot valve spool and pushing it into position for shifting of the air distribution valve. The chambers are manifolded together with a suction and discharge check valve for each chamber to maintain flow in one direction through the pump.

INSTALLATION PROCEDURES

Position the pump as close as possible to the source of the liquid to be pumped. Avoid long or undersize suction lines and use the minimum number of fittings.

For permanent installation involving rigid piping, install short flexible sections of hose between the pump and piping. This reduces strains and permits easier removal of the pump for service when required. **At time of installation, inspect all external gasketed fasteners for looseness caused by gasket creep. Tighten loose fittings securely to prevent leakage.**

AIR SUPPLY

Do not connect the unit to an air supply in excess of 100 PSI (7.0 bars). Install a shutoff valve in the air supply line to permit removal of the unit for servicing. When connecting an air supply of rigid piping, mount a section of flexible line to the pump to eliminate piping strain. In permanent installations, an air line filter is recommended. **The weight of the air supply line and of the filter must be supported by some means other than the air valve cap. Failure to provide support may result in damage to the pump. A pressure regulating valve should be installed to prevent pressure from exceeding recommended limits.**

LUBRICATION

A small amount of lightweight oil (SAE 10 wt. maximum) poured into the air inlet daily is recommended to lubricate the air distribution valve. An air line filter and lubricator is recommended on permanent installations. The lubricator should be set at a rate of one drop of oil for every 20 SCFM (Standard Cubic Feet per Minute) (9.44 lit./sec.) of air being used. When using EPDM elastomers, use no oil in the system or chemical attack may occur.

OPERATION

Your pump has been tested prior to shipment and is ready for use as received. It is completely self-priming and no initial filling with fluid is required.

If the unit is to be totally submerged, the air exhaust must be piped above liquid level to prevent the liquid and foreign material from entering the air distribution valve mechanism.

Open the inlet air valve at least one turn to allow sufficient cycling rate for

the pump to prime (30 to 60 cycles per minute). After pumping starts, adjust the inlet air valve for the desired pumping capacity. When further opening of the inlet air valve increases cycling rate without increasing the flow rate, the pump is being starved of liquid due to suction limitations. Further opening of the air inlet valve will waste compressed air. Set the inlet air valve for lowest cycling rate that does not decrease flow rate for most efficient operation.

FREEZING OR ICING OF EXHAUST

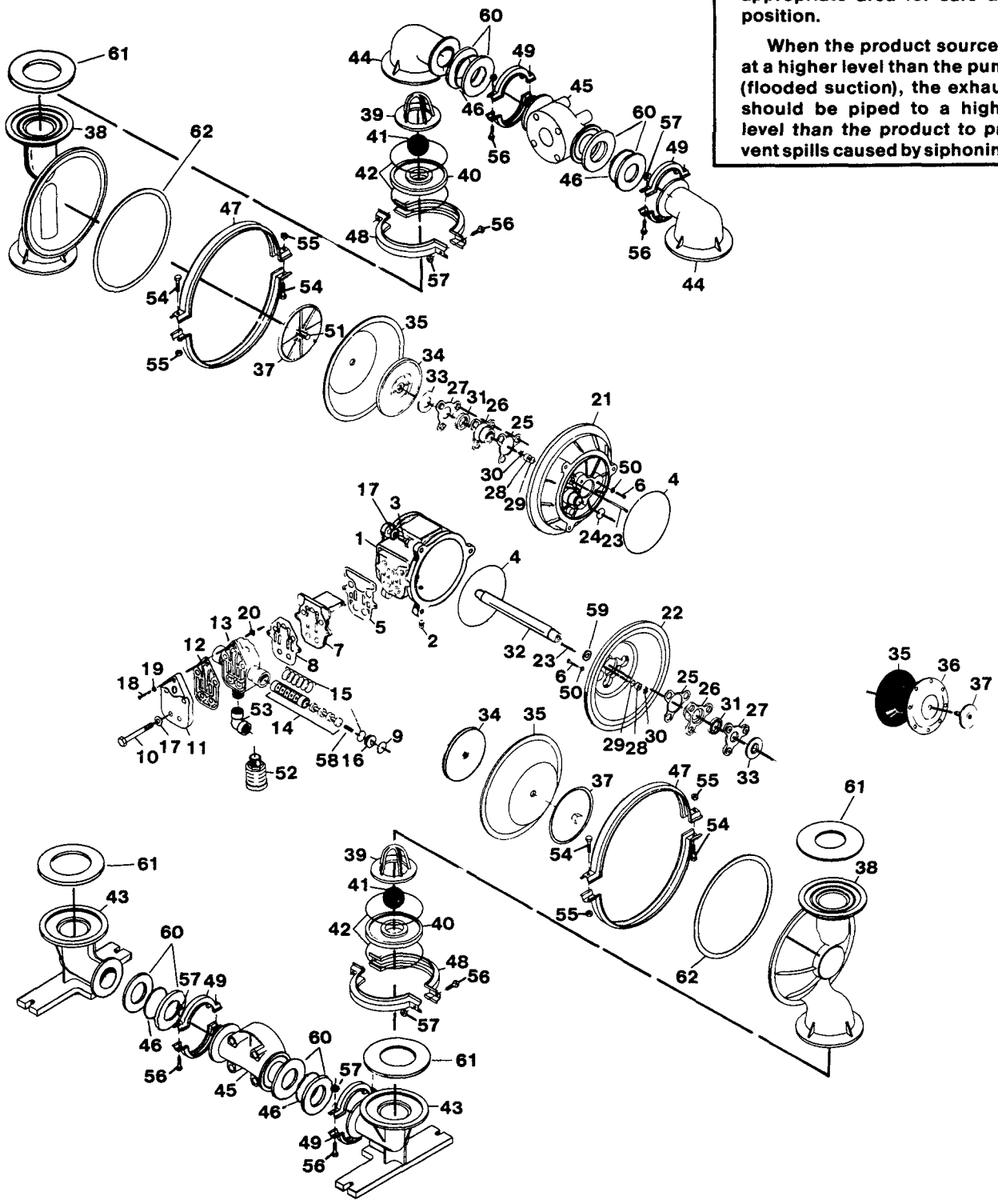
Icing of the air exhaust can occur under certain conditions of temperature and humidity on compressed air power equipment. When pump performance suffers because of icing, a non-sticky anti-freeze lubricant such as KILFROST, in an air line lubricator, will solve the problem. Icing is more likely to occur at high discharge pressures.

CAUTION

If a diaphragm fails, the pumped product or fumes can enter the air side of the pump. This side is exhausted through the exhaust port (muffler).

When the product is a hazardous or toxic material, the exhaust should be piped to an appropriate area for safe disposition.

When the product source is at a higher level than the pump (flooded suction), the exhaust should be piped to a higher level than the product to prevent spills caused by siphoning.



SERVICE PARTS

Item	Description	Model 84860	Model 84861	Qty.	Item	Description	Model 84860	Model 84861	Qty.
1	Intermediate bracket	240788	240788	1	33	Bumper	240809	240809	2
2	Pipe plug	240789	240789	1	34	Plate, inner dia.	240810	240810	2
3	Capscrew hex head	240790	240790	6	35	Diaphragm	240812(BN)	240811(NE)	2
4	O-ring	240791(BN)	240791(BN)	2	36	Overlay diaphragm	—	240815(TF)	2
5	Gasket	240701(BN)	240701(BN)	1	37	Plate, outer dia.	240816	240816	2
6	Screw, self-tapping	240663	240663	6	38	Chamber outer	240817	240817	2
7	Pilot valve assy.	240792	240792	1	39	Retainer, ball	240818	240818	4
8	Gasket	240793(BN)	240793(BN)	1	40	Seat, ball	240819	240819	4
9	Ring, retaining	240699	240699	2	41	Ball, check valve	240822(BN)	240820(TF)	4
10	Capscrew hex head	240794	240794	4	42	O-ring	240826(BN)	240825(TF)	8
11	Cap, valve body	240700	240700	1	43	Elbow, suction	240827	240827	2
12	Gasket	240703(BN)	240703(BN)	1	44	Elbow, discharge	240828	240828	2
13	Body, spool valve	240695	240695	1	45	Manifold	240829	240829	2
14	Sleeve & spool set	240795	240795	1	46	O-ring	240831(BN)	240830(TF)	4
15	O-ring	240697(BN)	240697(BN)	8	47	Clamp, V-band assy.	240832	240832	2
16	Cap, end	240698	240698	2	48	Clamp, V-band assy.	240833	240833	4
17	Washer	240796	240796	10	49	Clamp, V-band assy.	240834	240834	4
18	Capscrew, hex head	240782	240782	1	50	Washer	240692	240692	6
19	Washer, flat	240797	240797	1	51	Stud	240835	240835	2
20	Nut, square	240798	240798	1	52	Muffler	240836	240836	1
21	Chamber inner	240799	240799	1	53	Elbow 45°	240837	240837	1
22	Chamber inner	240800	240800	1	54	Capscrew	240838	240838	4
23	Plunger actuator	240801	240801	2	55	Hex nut	240813	240813	4
24	Ring, sealing	240802(BN)	240802(BN)	2	56	Carriage bolt	240670	240670	16
25	Gasket, bearing	240803	240803	2	57	Hex nut	240814	240814	16
26	Bearing, sleeve	240804	240804	2	58	Spring	239748	239748	1
27	Retainer bearing	240805	240805	2	59	Bumper	240719	240719	2
28	Bushing	240806	240806	2	60	Gasket	240821(TF)	240821(TF)	8
29	O-ring	240655(BN)	240655(BN)	2	61	Gasket	240823(TF)	240823(TF)	4
30	Ring, retaining	240717	240717	2	62	Gasket	240824(TF)	240824(TF)	2
31	Seal, U-cup	240807(BN)	240807(BN)	2					
32	Rod diaphragm	240808	240808	1					

(BN) Buna-N, (NE) Neoprene, (TF) Teflon

MAINTENANCE AFTER USE

CAUTION

Before maintenance or repair, shut off the compressed air line, bleed the pressure, and disconnect the air line from the pump. The discharge line may be pressurized and must be bled of its pressure. When the pump is used for toxic or aggressive fluids, it should be flushed clean prior to disassembly.

When the pump is used for materials that tend to settle out or transform from liquid to solid form, care must be taken after each use or during idle time to remove them and flush the pump as required to prevent damage.

In freezing temperatures the pump must be completely drained when idle. This model must be tilted to allow the liquid from the chambers to run out of the discharge port.

SERVICE INSTRUCTIONS: TROUBLESHOOTING

1. Pump will not cycle

A. Check to make sure the unit has enough pressure to operate and that the air inlet valve is open.

B. Check the discharge line to insure that the discharge line is neither closed nor blocked.

C. If the spool in the air distribution valve is not shifting, check the main spool. It must slide freely.

D. Excessive air leakage in the pump can prevent cycling. This condition will be evident. Air leakage into the discharge line indicates a ruptured diaphragm. Air leakage from the exhaust port indicates leakage in the air distribution valve. See further service instructions.

E. Blockage in the liquid chamber can impede movement of diaphragm.

2. Pump cycles but will not pump

A. Suction side of pump pulling in air. Check the suction line for air leaks and be sure that the end of the suction line is submerged. Check flange bolting. Check valve flanges and manifold to chamber flange joints.

B. Make certain the suction line or strainer is not plugged. Restriction at the suction is indicated by a high vacuum reading when a vacuum gauge is installed in the suction line.

C. Check valves may not be seating properly. To check, remove the suction line and cover the suction port with your hand. If the unit does not pull a good suction (vacuum), the check valves should be inspected for proper seating.

D. Static suction lift may be too high. Priming can be improved by elevating the suction and discharge lines higher than the check valves and pouring liquid into the unit through the suction inlet. When priming at high suction lifts or with long suction lines operate the pump at maximum cycle rate.

3. Low performance

A. Capacity is reduced as the discharge pressure increases, as indicated on the performance curve. Performance capability varies with available inlet air supply. Check air pressure at the pump inlet when the pump is operating to make certain that adequate air supply is maintained.

B. Check vacuum at the pump suction. Capacity is reduced as vacuum increases. Reduced flow rate due to starved suction will be evident when cycle rate can be varied without change in capacity. This condition will be more prevalent when pumping viscous liquids. When pumping thick, heavy materials the suction line must be kept as large in diameter and as short as possible, to keep suction loss minimal.

C. Low flow rate and slow cycling rate indicate restricted flow through the discharge line. Low flow rate and fast cycling rate indicate restriction in suction line or air leakage into suction.

D. Unstable cycling indicates improper check valve seating on one chamber. This condition is confirmed when unstable cycling repeats consistently on alternate exhausts. Cycling that is not consistently unstable may indicate partial exhaust restriction due to freezing and thawing of exhaust air. Use of an anti-freeze lubricant in an air line lubricator should solve this problem.

CHECK VALVE SERVICING

Need for inspection or service is usually indicated by poor priming, unstable cycling, reduced performance or the pump's cycling but not pumping.

Remove the four V-Band clamps securing the manifold assemblies to the outer chambers. Inspect the surfaces of both check valve and seat for wear or damage that could prevent proper sealing. If pump is to prime properly, valves must seat air tight.

DIAPHRAGM SERVICING

Remove the four V-Band clamps securing the manifold assemblies to the outer chambers. Remove the two V-Band clamps securing the outer chambers to the inner chambers. Remove the diaphragm assembly (outer plate, diaphragm, inner plate) by turning the assembly counterclockwise using a 1-7/16" (3.649 cm) wrench on the outer plate lugs. To disassemble the diaphragm assemblies, lock the inner plate in a soft jaws vice and turn the outer plate counterclockwise from the inner plate using the 1-7/16" wrench. Be sure inner plate is free of burrs. The interior components consisting of shaft seals, sleeve bearings and bearing retainers are now accessible for service.

Procedures for reassembling the diaphragms are the reverse of the above. The diaphragms must be installed with their natural bulge to the outside, toward the outer diaphragm plate. Install the inner plate with the flat face against the diaphragm.

After all the components are in position in a vise and hand tight, tighten with a wrench to approximate 35 ft. lbs. (420 in./lbs.) (4.838 kilograms/meters) torque. After both diaphragm assemblies have been assembled, thread on assembly into the shaft (hold the shaft near the middle in a vise with soft jaws, to protect the finish). Install this sub-assembly into the pump and secure by placing the outer chamber on the end with the diaphragm. This holds the assembly in place while the opposite side is installed. Torque the last diaphragm assembly to 25 ft. lbs. (3.456 kilograms/meters). This final torquing will lock the diaphragm assemblies together. Place the remaining outer chamber on the open end and loosely tighten the V-Band clamps. Replace the manifold assemblies to square the flanges before final tightening of the V-Band clamps.

AIR DISTRIBUTION VALVE SERVICING

The spool and sleeve are rust and corrosion resistant brass and hardened stainless steel. The spool is closely sized to the sleeve and should slide freely. Accumulation of dirt and oils may prevent the pump from cycling. Remove the valve body from the center pump housing, remove the end caps, and push the spool out of the sleeve. Wash the parts in cleaning solvent or kerosene, and check the spool and sleeve for possible roughness, nicks or scratches. Use a fine stone or crocus cloth to carefully remove any irregular marks on the surfaces. When the spool slides freely on the sleeve, coat the parts with light oil and reassemble. The four capscrews inserted through the valve body cap to hold the air valve to the intermediate section should be torqued to 150 in./lbs. (1.729 kilograms/meter).

PILOT VALVE SERVICING

This assembly is reached by removing the air distribution valve body from the pump and lifting the pilot valve body out of the intermediate housing.

PILOT VALVE ACTUATOR SERVICING

The bushings for the pilot valve actuators are pressed into the intermediate bracket from the outside. The plunger may be removed for inspection or replacement from the inside by removing the air distribution valve body and the pilot valve body from the pump. The plungers should be visible as you look into the intermediate from the top. Depending on their position, you may find it necessary to use a fine piece of wire to pull them out.

Under rare circumstances, it may become necessary to replace the o-ring seal. The bushing can be pushed through the inner chamber by removing the outer chamber assembly to reach the bushing and removing the bushing retaining ring.

RETAIN THIS INFORMATION FOR FUTURE REFERENCE

When ordering replacement parts, list: Part Number, Description, Model Number, and Series Letter.

LINCOLN provides a Distributor Network that stocks equipment and replacement parts.