

OPERATOR'S MANUAL

DP21-40AXXXXXX

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

Rev.a

1-1/2" DIAPHRAGM PUMP

1:1 RATIO (METALLIC)



READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.

SERVICE KITS

Refer to "Model Description Chart" to match the pump material options.

DP21-Air40 for Air Section repair (see page 8).

DP21-Flu40-XXX for fluid section repair with seats (see page 4).

DP21-Flu40-XX for fluid section repair without seats (see page 4).

PUMP DATA

Models..... see Model Description Chart for "XXXXXX" .

Pump Type... Metallic, Air Operated, Double Diaphragm

Material..... see Model Description Chart

Weight Aluminum: (23.4kgs)

Stainless Steel: (38.3kgs)

Cast Iron: (36.1kgs)

Maximum Air Inlet Pressure. 120 p.s.i. (8.3 bar)

Maximum Outlet Pressure. 120 p.s.i. (8.3 bar)

Maximum Flow Rate (flooded inlet). . 91.8 gpm (347.5 lpm)

Maximum Particle Size 1/4" dia. (6.4 mm)

Maximum Dry Suction Lift 19 feet (5.8m)

Dimensional Data. see page 10

Noise Level @ 70 p.s.i. - 60 cpm. 80.5 dB(A)

NOTICE: All possible options are shown in the chart, however, certain combinations may not be recommended, consult a representative or the factory if you have questions concerning availability.

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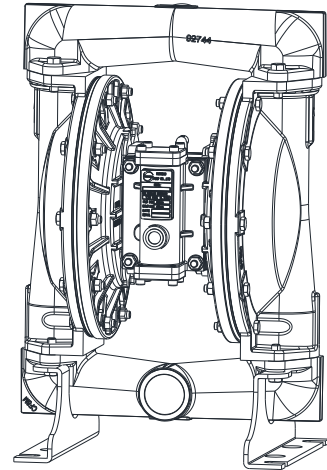


Figure 1

GENERAL DESCRIPTION

Our Diaphragm Pump offers high volume delivery even at low air pressures and a broad range of material compatibility options available.

Refer to the model and option chart. Our pumps features stall-resistant design, maintenance-free air motor with a long lifespan, modular air motor/ fluid sections.

Air Operated diaphragm pumps utilize a pressure differential in the air chambers to alternately create suction and positive fluid pressure in the fluid chambers, ball checks insure a positive flow of fluid.

Pump cycling will begin as air pressure is applied and it will continue to pump and keep up with the demand.

It will build and maintain line pressure and will stop cycling once maximum line pressure is reached(dispensing device closed) and will resume pumping as needed.

◆MODEL DESCRIPTIONS CHART:

DP21	-	40	X	X	X	X	X	X	X
		Pump Size	Center Body Mat.	Fluid Caps Manifold Mat.	Seat Material	Ball Check Material	Diaphragm Material	Fluid Connections	Hardware
Pump Size			40-1 1/2"						
Center Body Mat.			A-Aluminum			C-Cast Iron			
Fluid Caps Manifold Mat.			A - Aluminum			S -Stainless Steel		C-Cast Iron	
Seat Material			1 - Aluminum		2 - 316 Stainless Steel		3-Polypropylene		4-PVDF(Kynar)
			5-Carbon Steel		8-Hard 400 Stainless Steel				
Ball Check Material			1-Neoprene		2-Nitrile		3-Viton		4-PTFE
			5-E.P.R		6-Acetal		8-Polyurethane		A-Stainless Steel
			C-Hytrel			E-Santoprene			
Diaphragm Material			1-Neoprene		2-Nitrile		3-Viton		4-PTFE/Santoprene
			5-E.P.R		6-Acetal		9-Hytrel		B-Santoprene
			G-Nitrile						
Fluid Connections			N-NPT Threads			B-BSP Threads			
Hardware			S-Stainless Steel			C-Carbon Steel			

Service Repair Kits:

DP21-Air40(air section)

DP21-Flu40 -XX(fluid section)

└─ Diaphragm Material
└─ Ball Material



OPERATING AND SAFETY PRECAUTIONS

READ, UNDERSTAND, AND FOLLOW THIS INFORMATION TO AVOID INJURY AND PROPERTY DAMAGE.



**EXCESSIVE AIR PRESSURE
STATIC SPARK**



**HAZARDOUS MATERIALS
HAZARDOUS PRESSURE**

⚠ WARNING EXCESSIVE AIR PRESSURE. Can cause personal injury, pump damage or property damage.

- Be sure material hoses and other components are able to withstand fluid pressures developed by this pump. Check all hoses for damage or wear. Be certain dispensing device is clean and in proper working condition.
- Do not exceed the maximum inlet air pressure as stated on the pump model plate.

⚠ WARNING STATIC SPARK. Can cause explosion resulting in severe injury or death. Ground pump and pumping system.

- Sparks can ignite flammable material and vapors.
- The pumping system and object being sprayed must be grounded when it is pumping, flushing, recirculating or spraying flammable materials such as paints, solvents, lacquers, etc. or used in a location where surrounding atmosphere is conducive to spontaneous combustion. Ground the dispensing valve or device, containers, hoses and any object to which material is being pumped.
- Secure pump, connections and all contact points to avoid vibration and generation of contact or static spark.
- Consult local building codes and electrical codes for specific grounding requirements.
- After grounding, periodically verify continuity of electrical path to ground. Test with an ohmmeter from each component (e.g., hoses, pump, clamps, container, spray gun, etc.) to ground to insure continuity. Ohmmeter should show 0.1 ohms or less.
- Submerge the outlet hose end, dispensing valve or device in the material being dispensed if possible. (Avoid free streaming of material being dispensed.)
- Use hoses incorporating a static wire.
- Use proper ventilation.
- Keep inflammables away from heat, open flames and sparks.
- Keep containers closed when not in use.

⚠ WARNING Pump exhaust may contain contaminants. Can cause severe injury. Pipe exhaust away from work area and personnel.

- In the event of a diaphragm rupture, material can be forced out of the air exhaust muffler.
- Pipe the exhaust to a safe remote location when pumping hazardous or inflammable materials.
- Use a grounded 3/8 minimum i.d. hose between the pump and the muffler.

⚠ WARNING HAZARDOUS PRESSURE. Can result in serious injury or property damage. Do not service or clean pump, hoses or dispensing valve while the system is pressurized.

- Disconnect air supply line and relieve pressure from the system by opening dispensing valve or device and / or carefully and slowly loosening and removing outlet hose or piping from pump.

⚠ WARNING HAZARDOUS MATERIALS. Can cause serious injury or property damage. Do not attempt to return a pump to the factory or service center that contains hazardous material. Safe handling practices must comply with local and national laws and safety code requirements.

- Obtain Material Safety Data Sheets on all materials from the supplier for proper handling instructions.

⚠ WARNING EXPLOSION HAZARD. Models containing aluminum wetted parts cannot be used with 1,1,1-trichloroethane, methylene chloride or other halogenated hydrocarbon solvents which may react and explode.

- Check pump motor section, fluid caps, manifolds and all wetted parts to assure compatibility before using with solvents of this type.

⚠ CAUTION Verify the chemical compatibility of the pump wetted parts and the substance being pumped, flushed or recirculated. Chemical compatibility may change with temperature and concentration of the chemical(s) within the substances being pumped, flushed or circulated. For specific fluid compatibility, consult the chemical manufacturer.

⚠ CAUTION Maximum temperatures are based on mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperature. Consult the chemical manufacturer for chemical compatibility and temperature limits. Refer to PUMP DATA on page 1 of this manual.

⚠ CAUTION Be certain all operators of this equipment have been trained for safe working practices, understand its limitations, and wear safety goggles / equipment when required.

⚠ CAUTION Do not use the pump for the structural support of the piping system. Be certain the system components are properly supported to prevent stress on the pump parts.

- Suction and discharge connections should be flexible connections (such as hose), not rigid piped, and should be compatible with the substance being pumped.

⚠ CAUTION Prevent unnecessary damage to the pump. Do not allow pump to operate when out of material for long periods of time.

- Disconnect air line from pump when system sits idle for long periods of time.

⚠ CAUTION Use only genuine replacement parts to assure compatible pressure rating and longest service life

NOTICE Replacement warning labels are available upon request: Static Spark PN \ 93122 & Diaphragm Rupture PN \ 93616-1.

NOTICE RE-TORQUE ALL FASTENERS BEFORE OPERATION. Creep of housing and gasket materials may cause fasteners to loosen. Re-torque all fasteners to insure against fluid or air leakage.

⚠ WARNING = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

⚠ CAUTION = Hazards or unsafe practices which could result in minor personal injury, product or property damage.

NOTICE = Important installation, operation or maintenance information.



AIR AND LUBE REQUIREMENTS

⚠ WARNING EXCESSIVE AIR PRESSURE. Can cause pump damage, personal injury or property damage.

- A filter capable of filtering out particles larger than 50 microns should be used on the air supply. There is no lubrication required other than the ring lubricant which is applied during assembly or repair.
- If lubricated air is present, make sure that is compatible with the Nitrile rings in the air motor section of the pump.

OPERATING INSTRUCTIONS

- Always flush the pump with a solvent compatible with the material being pumped if the material being pumped is subject to setting up when not in use for a period of time.
- Disconnect the air supply from the pump if it is to be inactive for a few hours.
- The outlet material volume is governed not only by the air supply but also by the material supply available at the inlet. The material supply tubing should not be too small or restrictive. Be sure not to use hose which might collapse.
- When the diaphragm pump is used in a forced-feed (flooded inlet) situation, it is recommended that a Check Valve be installed at the air inlet.
- Secure the diaphragm pump legs to a suitable surface to insure against damage by vibration.

MAINTENANCE

Refer to the part views and descriptions as provided on page 4 through 9 for parts identification and Service Kit information

- Certain Smart Parts are indicated which should be available for fast repair and reduction of down time.
- Service kits are divided to service two separate diaphragm pump functions: 1. AIR SECTION, 2. FLUID SECTION. The FLUID SECTION is divided further to match typical part MATERIAL OPTIONS.
- Provide a clean work surface to protect sensitive internal moving parts from contamination from dirt and foreign matter during service disassembly and reassembly.
- Keep good records of service activity and include pump in preventive maintenance program.
- Before disassembling empty captured material in the outlet manifold by turning the pump upside down to drain material from the pump.

FLUID SECTION DISASSEMBLY

1. Remove manifold(s).
 2. Remove (15) balls, (16) O-rings, and (17) Seats.
 3. Remove (9) fluid caps.
- NOTE:** Only PTFE diaphragm models use a primary diaphragm (5) and a backup diaphragm (4).
4. Remove the (8) screws, (6) washers, (5) or (5/4) diaphragms and (3) washers.
 5. Remove (2) "O" rings.

FLUID SECTION REASSEMBLY

- Reassemble in reverse order.
- Clean and inspect all parts. Replace worn or damaged parts with new parts as required.
- Lubricate (1) diaphragm rod with white grease.
- Be certain (5) or (5/4) diaphragm(s) align properly with (9) fluid caps before making final torque adjustments on bolt and nuts to avoid twisting the diaphragm.
- For models with PTFE diaphragms: Item (4) Santoprene diaphragm is installed with the side marked AIR SIDE towards the pump center body. Install the PTFE Diaphragm with the side marked FLUID SIDE towards the fluid cap.
- When reassemble (130) Y-type rings, Pay attention to the orientation of Y-type rings. Must ensure correct installation. See Figure 7.
- Re-check torque settings after pump has been restarted and run awhile.



PARTS LIST / DP21-40AXXXXXX FLUID SECTION

DP21-Flu40-XX FLUID SECTION KITS include: BALLS(see Ball Option), DIAPHRAGMS (see Diaphragm Option), plus item16, item 2, and white lubricating grease.

Position number	Description	Part number	Material	Quantity
1	Rod	NDA-PD76	SS304	1
2	O-ring	Y328-16	PTFE	4
3	Washer-Air Side	NDA-PH68	Electrophoretic Steel	2
4	Backer Diaphragm	94616	Santoprene(Green)	2
5	Diaphragm	92755-1	Neoprene	2
		92755-2	Nitrile	2
		92755-3	Viton	2
		94617	PTFE	2
		94615-9	Hytrel	2
		94615-A	Santoprene(Yellow)	2
6	Washer-Fluid Side	92775	Stainless Steel	2
7	Washer	93065	Stainless Steel	2
8	Bolt M16x1.5x45	NDA-PX32	Stainless Steel	2
9	Fluid Cap	92750	Aluminum	2
		97621	Stainless Steel ANSI 316	2
		92778	Cast Iron	2
10	Nut (M8)	NDA-PX11	Steel	20
		NDA-PX12	Stainless Steel	20
11	Bolt (M8x45)	NDA-PX62	Steel	20
		NDA-PX63	Stainless Steel	20
12a	Bolt (M10x35)	NDA-PX64	Steel	4
		NDA-PX65	Stainless Steel	4
	Bolt (3/8" - 16 x 1-1/4")	Y6-66-T	Stainless Steel	4
12b	Bolt (M10x40)	NDA-PX35	Steel	4
		NDA-PX36	Stainless Steel	4
		Y6-66-T	Stainless Steel	4
13	Leg	NDA-PN110	Electrophoretic Steel	2
		NDA-PN109	Stainless Steel	2
14	Manifold	92749 (NPTF)	Aluminum	2
		92749-1 (BSP)	Aluminum	2
		92774 (NPTF)	Stainless Steel ANSI 316	2
		92774-1 (BSP)	Stainless Steel ANSI 316	2
		92777 (NPTF)	Cast Iron	2
		92777-1 (BSP)	Cast Iron	2
15	Ball (44.45mm dia.)	92757-1	Neoprene	4
				4
		92757-2	Nitrile	4
		92757-3	Viton	4
		92757-4	PTFE	4
		92757-5	E.P.R	4
		94804	Stainless Steel	4
		92757-C	Hytrel	4
		92757-A	Santoprene(Yellow)	4
16	O-ring	Y325-230	Nitrile	4
		Y327-230	Viton	4
		Y220-230	PTFE	4
		92761	E.P.R	4
17	Seat	92760	Aluminum	4
		92776	Stainless Steel ANSI 316	4
		92924	Polypropylene	4
		95676	Carbon Steel	4

NOTE: Only PTFE diaphragm models use a primary diaphragm (5) and a backup diaphragm (4).



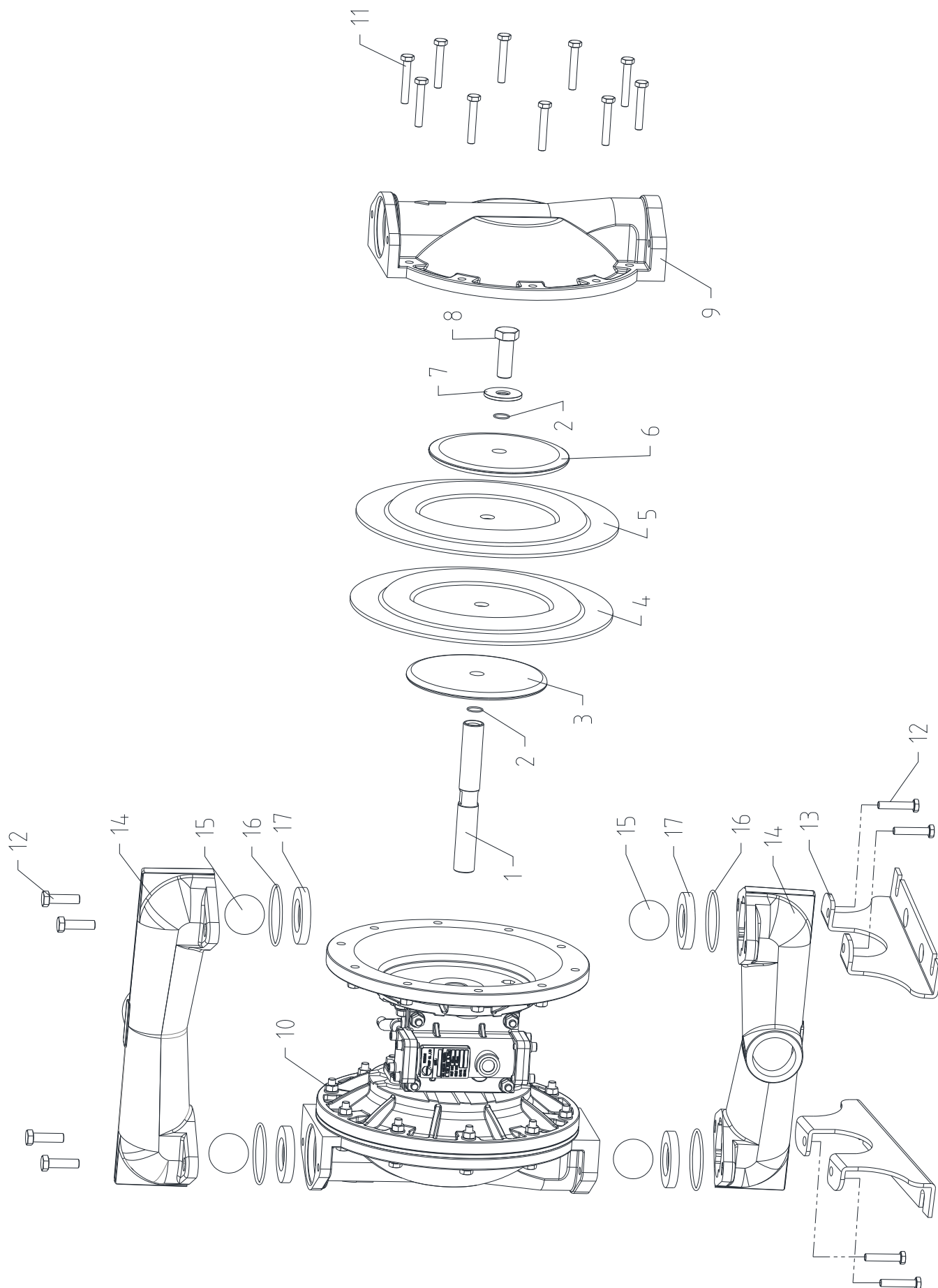


Figure 2

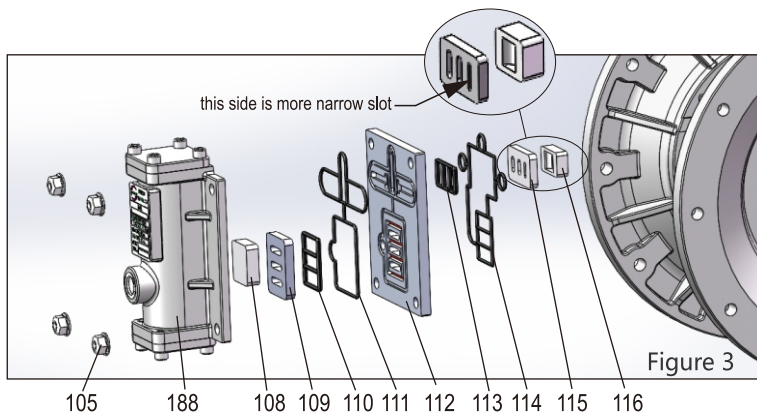
AIR MOTOR SECTION SERVICE

Service is divided into two parts- 1. Pilot Valve, 2. Major Valve
GENERAL REASSEMBLY NOTES:

- Air Motor Section Service is continued from Fluid Section repair.
- Inspect and replace old parts with new parts as necessary. Look for deep scratches on surfaces, and nicks or cuts in "O"rings and Y-type rings.
- Take precautions to prevent cutting "O"rings and Y-type rings upon installation.
- Lubricate "O"rings and Y-type rings with lubricant grease.
- Do not overtighten fasteners, refer to torque specification block on view.
- Re-torque fasteners following restart.

PILOT VALVE DISASSEMBLY

1. Remove (105) nuts, and (188) major valve. See figure 3.
2. Remove (108), (109), (110), (111), (112), (113), (114), (115),



3. Remove (128), (146), (129), (145), (121), and (143). See figure 4 & figure 7.

4. Remove (131) sleeves from (117) center block, and remove (130) Y-type rings from (146) & (129). See figure 5.

5. Remove (124), (126), and (125). See figure 4.

6. Remove (132) and (133). See figure 4.

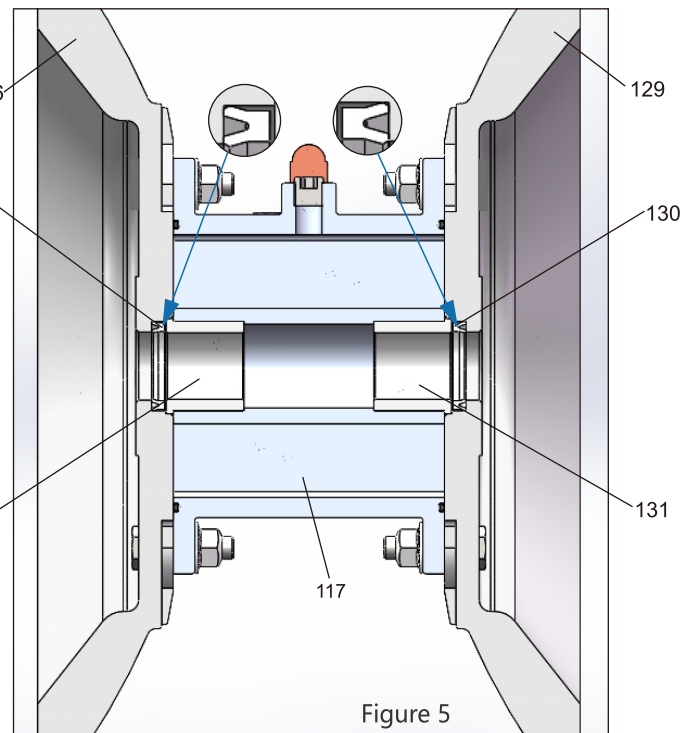
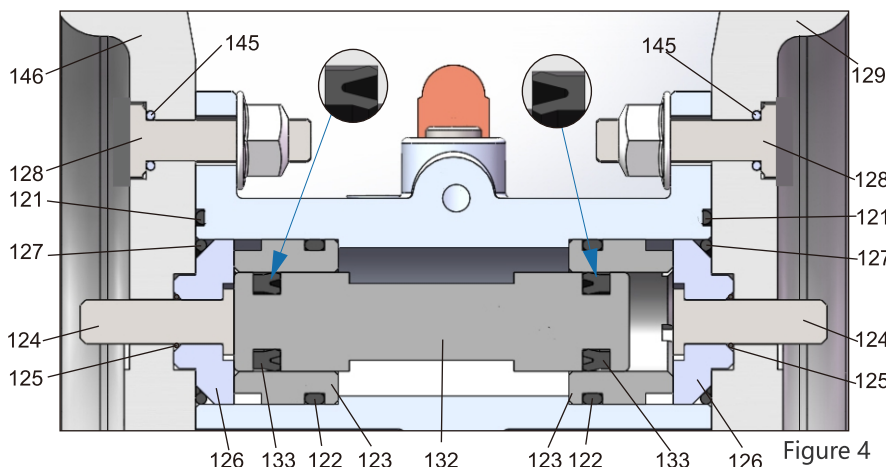


Figure 5

PILOT VALVE REASSEMBLY

1. Replace all o-rings, Y-type rings and gaskets if worn or damaged. These are (110), (111), (113), (114), (145), (121), (127), (125), (133), and (122).

2. Look for deep scratches or damages on sealing surfaces of (108) and (109). If there are scratches or damages, Replace them.

Note: (108) and (109) are not included in Air Section Repair Kit, but Keep them on hand in addition to the Service Kits for fast repair and reduction of down time.

3. Look for deep scratches or damages on sealing surfaces of (115) and (116). If there are scratches or damages, Replace them.

Note: (115) and (116) are not included in Air Section Repair Kit, but Keep them on hand in addition to the Service Kits for fast repair and reduction of down time.

4. Reassemble in reverse order.

Note:

- In the process of reassembly, be careful and not brutal.
- Lubricate all o-rings and Y-type rings with lubricant grease.
- Lubricate the sealing surfaces with lubricant grease, where (108) and (109) contact with each other.
- Lubricate the sealing surfaces with lubricant grease, where (115) and (116) contact with each other.
- Pay attention to the orientation of (115). Must ensure correct installation.
- Lubricate (124) with lubricant grease.
- Pay attention to the orientation of Y-type rings (133)

MAJOR VALVE DISASSEMBLY

1. Remove (105) nuts, then remove the assembly of major valve. See Figure 6.
2. Remove (109) valve plate and (108) valve insert. See Figure 6.
3. Remove (101)screws, (102)covers. See Figure 6.
4. Remove (103)O-rings. See Figure 6.
5. Remove (140),(138),(136) &(134) .See Figure 6.
6. Remove (141). See Figure 6.
7. Remove (104). See Figure 6.
8. Remove (135)Y-type ring from (134); Remove (137) Y-type ring from (138); Remove (139)o-rings from (138) &(141). See Figure 6.

MAJOR VALVE REASSEMBLY

1. Replace all o-rings,Y-type rings and gaskets if worn or damaged. These are (103),(135),(137), and (139).
2. Look for deep scratches or damages on sealing surfaces of (109) valve plate and (108) valve insert. If there are scratches or damages , replace them.

Note: (109) valve plate and (108) valve insert are not included in Air Section Repair Kit, but Keep them on hand in addition to the Service Kits for fast repair and reduction of down time.

3. Reassemble in reverse order.

Note:

- In the process of reassembly, be careful and not brutal.
- Lubricate all o-rings and Y-type rings with lubricant grease.
- Lubricate the sealing surfaces with lubricant grease, where (109) and (108) contact with each other.
- Pay attention to the orientation of Y-type rings (135)&(137). Must ensure correct installation.
- Pay attention to the orientation of (108). Must ensure

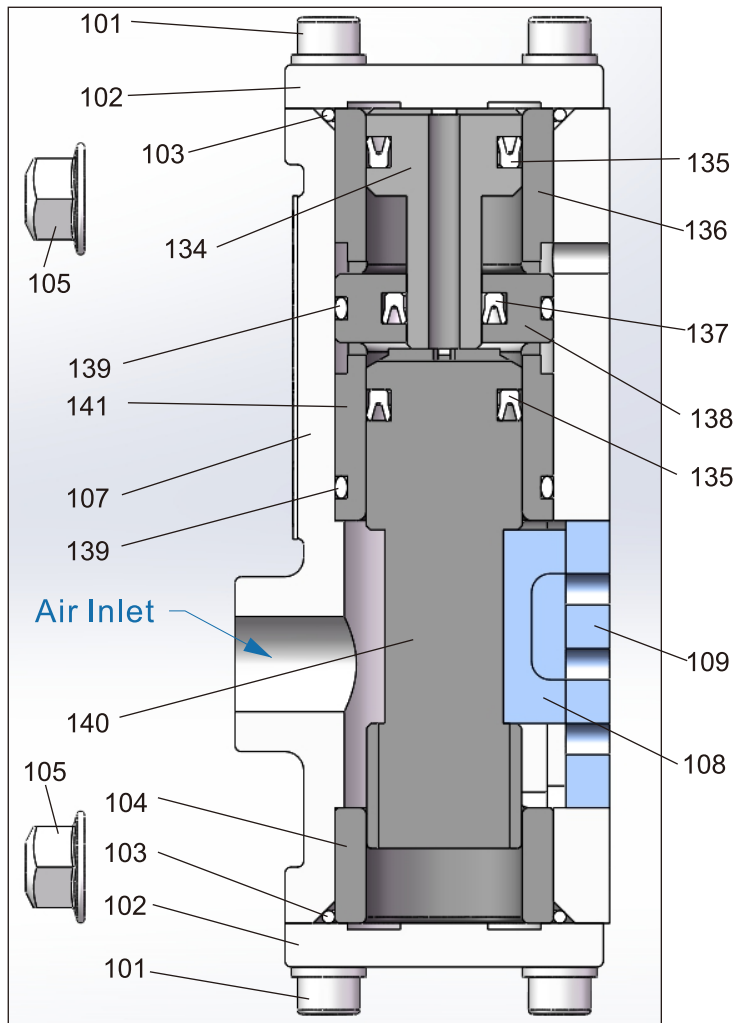


Figure 6



PARTS LIST / DP21-40AXXXXXX AIR MOTOR SECTION

Position number	Description	Part number	Material	Quantity
101	Screw(M6*16)	NDA-PX16	Steel	8
	Screw(M6*16)	NDA-PX17	Stainless Steel	8
102	Motor Cap	NDA-PJ66	Aluminum	2
103	O-Ring 35*2.4(ID*Sec.)	NDA-PY14	Nitrile	2
104	Guide Bush	NDA-PK77	POM	1
105	Nut(M8)	NDA-PX11	Steel	4
	Nut(M8)	NDA-PX12	Stainless Steel	4
106	Screw(M8*40)	NDA-PX14	Stainless Steel	4
107	Air Valve Body	NDA-PI66	Aluminum	1
108	Valve Insert	NDA-PK83	Ceramic	1
109	Valve Plate	NDA-PK84	Ceramic	1
110	Gasket	NDA-PF67	Nitrile	1
111	Gasket	NDA-PF66	Nitrile	1
112	Adapter Plate	NDA-PN67	Aluminum	1
113	Gasket	NDA-PF69	Nitrile	1
114	Gasket	NDA-PF68	Nitrile	1
115	Valve Plate	NDA-PK75	Ceramic	1
116	Valve Insert	NDA-PK76	Ceramic	1
117	Pump Body	NDA-PA66	Aluminum	1
118	Nut(M8)	NDA-PX11	Steel	8
	Nut(M8)	NDA-PX12	Stainless Steel	8
119	Ground Lug	93004	Copper	1
120	Screw (M5x15)	NDA-PX15	Stainless Steel	1
121	Gasket	NDA-PF70	Nitrile	2
122	O-ring 25*2.65 (ID*Sec.)	NDA-PY15	Nitrile	2
123	Guide Bush	NDA-PK69	POM	2
124	Pilot Pin	NDA-PK140	Stainless Steel	2
125	O-ring 5*1.5 (ID*Sec.)	NDA-PY16	PU/NBR	2
126	Retainer Ring	NDA-PK139	Brass	2
127	O-Ring 25*2.65 (ID*Sec.)	NDA-PY15	Nitrile	2
128	Bolt (M8x25)	NDA-PX25	Steel	8
	Bolt (M8x25)	NDA-PX26	Stainless Steel	8
129	Right Air Cap	NDA-PB109	Aluminum	1
130	Y Seal Ring (31*23*4.5)	NDA-PS203	Nitrile	2
131	Bush	NDA-PG68	POM	2
132	Spool	NDA-PK73	POM	1
133	Y Seal Ring(18*10*4.5)	NDA-PS67	Nitrile	2
134	Shaft	NDA-PK80	Nitrile	1
135	Y Seal Ring(25x17x4.5)	NDA-PS68	Nitrile	2
136	Bush	NDA-PK79	POM	1
137	Y Seal Ring(20x12x4.5)	NDA-PS69	Nitrile	1
138	Retainer Ring	NDA-PK81	POM	1
139	O-ring 30*2.65(ID*Sec.)	NDA-PY18	Nitrile	2
140	Spool	NDA-PK78	POM	1
141	Guide Bush	NDA-PK82	POM	1
142	Muffler	93139	Polypropylene	1
143	O-ring 15*2.65 (ID*Sec.)	NDA-PY17	Nitrile	2
144	Plug 1/8"	NDA-PN106	Stainless Steel	1
145	O-ring 7*2(ID*Sec.)	NDA-PY25	Nitrile	8
146	Left Air Cap	NDA-PB108	Aluminum	1





Figure 7

TROUBLE SHOOTING

Product discharged from exhaust outlet

- Check for diaphragm rupture.
- Check tightness of diaphragm nut.

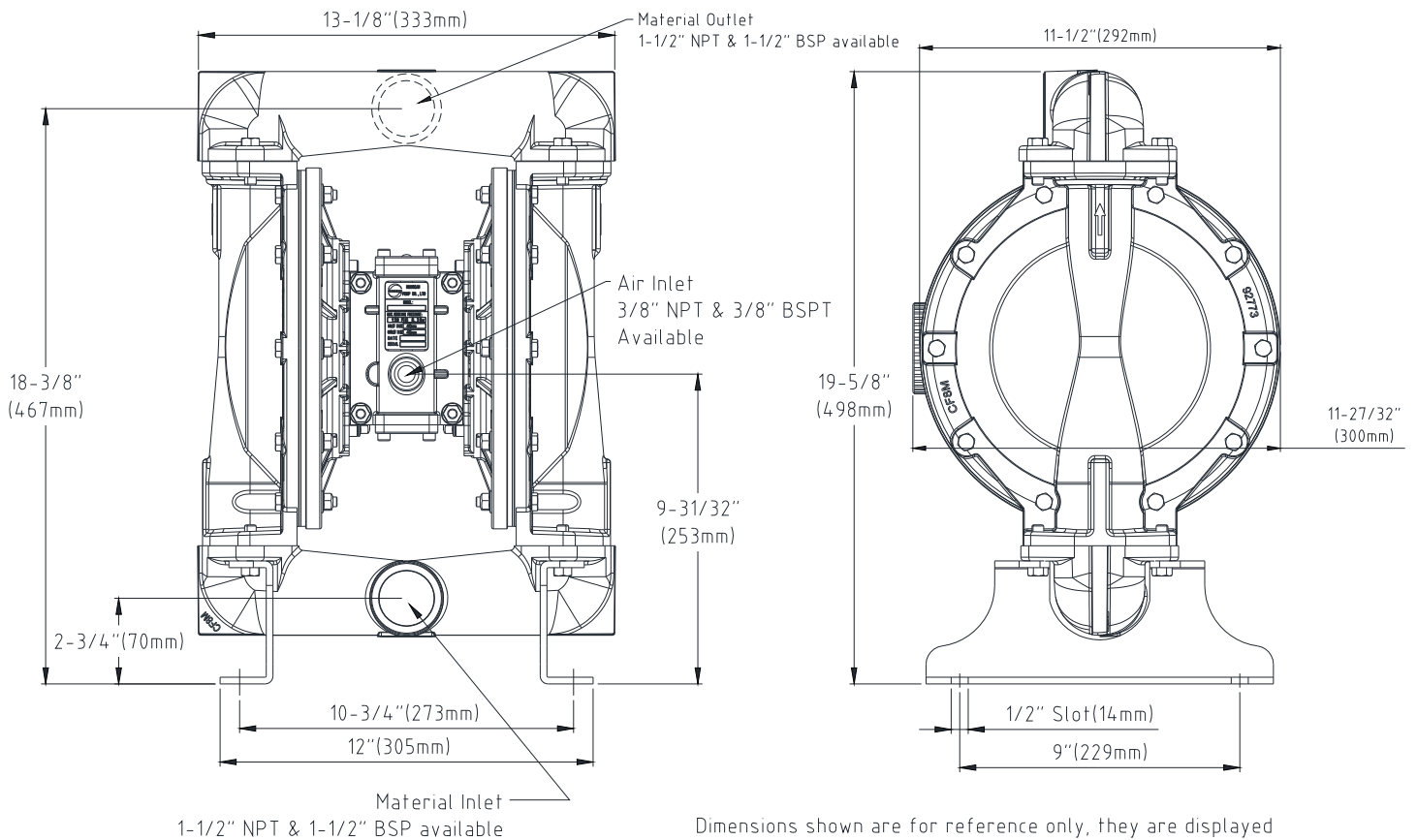
Air bubbles in product discharge.

- Check connections of suction plumbing.
- Check o-rings between intake manifold and fluid caps.
- Check tightness of diaphragm nut.

Low output volume, erratic flow, or no flow.

- Check air supply.
- Check for plugged outlet hose.
- Check for kinked (restrictive) outlet material hose.
- Check for kinked (restrictive) or collapsed inlet material hose.
- Check for pump cavitation—suction pipe should be sized at least as large as the inlet thread diameter of the pump for proper flow if high viscosity fluids are being pumped. Suction hose must be a non-collapsing type, capable of pulling a high vacuum.
- Check all joints on the inlet manifolds and suction connections. These must be air tight.
- Inspect the pump for solid objects lodged in the diaphragm chamber or the seat area.

DIMENSIONAL DATA



Dimensions shown are for reference only, they are displayed in inches and millimeters (mm).

