

# OPERATOR'S MANUAL

DP26-50-XXXXXX

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

Rev.a

## 2" POWDER 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-AIR50** for Air Section repair (see page 10).

**DP21-Flu50-XXX** for fluid section repair with seats (see page 5).

**DP21-Flu50-XX** for fluid section repair without seats (see page 5).

### PUMP INLET PRESSURE:

**Air Inlet:** The compressed air that drive the pump ,is connected to this Air Inlet.

Maximum Air Inlet Pressure: 50psi(3.4 bar)

**Fluidizing Gas Inlet:** The inert gas or air to fluidize the powder , is connected to this Fluidizing Gas Inlet.

Maximum Fluidizing Pressure: 100psi(6.9 bar)

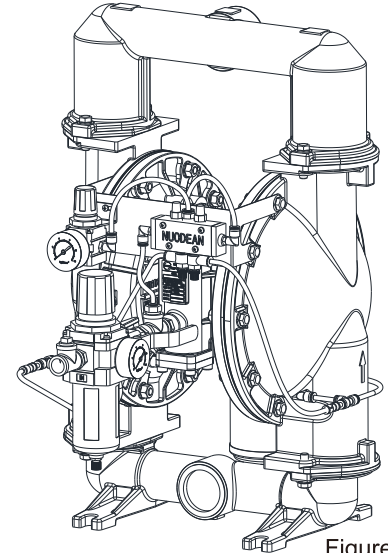


Figure 1

Transfer and handle your dry process powder faster, cleaner and at a fraction of the cost associated with installed "systems".

Consistent trouble-free transfer of powders up to 45-lbs.per cubic foot(721kgs. per cubic meter) dry-weight, such as carbon black, expanded mica, silicones, acrylic resins, 3D printing powders and pharmaceuticals.

- Replace manual powder processes
- Reduce airborne contamination-with direct transfer from the powdercontainer to your recipe.
- Special air-induction system-avoids the possibility of powder pack-out.
- Portable-Can be moved from site to site.

### Model Description Chart:

Position		1		2	3	4	5	6	7
	DP26-	XX	-	X	X	X	X	X	X

Position 1 Size	Position 2 Connections	Position 3 Wetted Parts	Position 4 Hardware	Position 5 Seat Material	Position 6 Ball Material	Position 7 Diaphragm Material
40-- 1-1/2"	A-NPT Screwed	A-Aluminum	P-Plated Steel	A-Santoprene	A-Santoprene	A-Santoprene
50--2"	B-BSPT Screwed	S-Stainless Steel	S-Stainless Steel	S-Stainless Steel		M-Medical Grade Santoprene
80--3"						

### Service Repair Kits:

DP21-Air50(air section)

DP21-Flu50 - XX(fluid section)

Diaphragm Material  
Ball Material



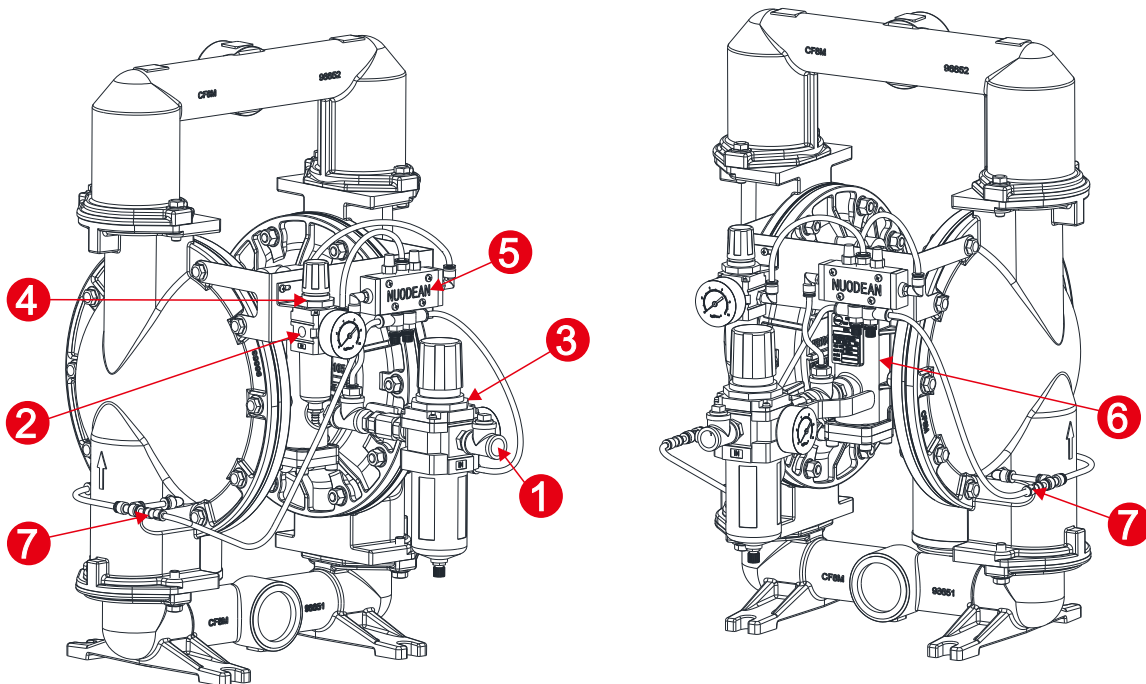


Figure 2

- 1 Air Inlet:** The compressed air that drive the pump ,is connected to this Air Inlet.  
Maximum Air Inlet Pressure: 50psi(3.4 bar)
- 2 Fluidizing Gas Inlet:** The inert gas or air to fluidize the powder , is connected to this Fluidizing Gas Inlet.  
Maximum Fluidizing Pressure: 100psi(6.9 bar)
- 3 Piggyback Air Filter/Regulator:** Used for the compressed air that drive the pump
- 4 Air Filter/Regulator:** Used for the inert gas or air that fluidize the powder
- 5 2-postion 5-way valve:** Alternately blow the fluidizing air (or other inert gas) into the two fluid chambers to fluidize the powder inside .
- 6 Pump Major Air Valve:** NUODEAN's air valve features patented, stall-free design.
- 7 Air Check Valve**

## 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.

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## AIR AND LUBE REQUIREMENTS

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**⚠ 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.

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## OPERATING INSTRUCTIONS

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- 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.
- Secure the diaphragm pump legs to a suitable surface to insure against damage by vibration.

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## MAINTENANCE

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Refer to the part views and descriptions as provided on page 4 through 7 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.

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## FLUID SECTION DISASSEMBLY

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1. Remove top manifold(s).
2. Remove (15) balls, (16) O-Rings, (17) Seats.
3. Remove (9) fluid caps.

**NOTE:** Only PTFE diaphragm models use a primary diaphragm(5) and a backup diaphragm (4). Refer to the auxiliary view in the Fluid Section illustration.

4. Remove the (8) screws, (6) washers, (5/4)diaphragms and (3) washers.
5. Remove (2) O-rings.

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## FLUID SECTION REASSEMBLY

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- 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 (130), Must ensure correct installation. See Figure 8.
- Re-check torque settings after pump has been restarted and run awhile.



# PARTS LIST / DP26-50-XXXXXX FLUID SECTION

★ **DP21-Flu50-XX FLUID SECTION KITS** include:BALLS(see Ball Option), DIAPHRAGMS (see Diaphragm option), plus items: (16), and (2). and White lubricating grease.

Position number	Description	Part number	Material	Quantity
1	Rod	NDA-PD75	Stainless Steel	1
2	O-Ring	Y328-16	PTFE	2
3	Washer-Air Side	NDA-PH70	Electrophoretic Steel	2
4	Backer Diaphragm	96393-A	Santoprene(Green)	2
5	Diaphragm	97284-2	Nitrile	2
		96392-T	PTFE	2
		96391-C	Hytre	2
		96391-A	Santoprene(Yellow)	2
6	Washer-Fluid Side	96503	Aluminum	2
		94375-2	Stainless Steel ANSI 316	2
7	Washer	93065	Stainless Steel	2
8	Bolt M16x1.5x50	NDA-PX45	Stainless Steel	2
9	Fluid Cap	96377-Powder	Aluminum	2
		97626-Powder	Stainless Steel ANSI 316	2
		96635-Powder	Cast Iron	2
10	Nut M10	94992-1	Steel	20
		94992	Stainless Steel	20
11	Bolt M10x45	94990-1	Steel	20
		94990	Stainless Steel	20
12	Bolt M10x35	94409-1	Steel	8
		94409-2	Stainless Steel	8
13	Nipple	NDA-PU05	Stainless Steel	1
14	Outlet Manifold	96375-1 (NPTF)	Aluminum	1
		96375-2 (BSP)	Aluminum	1
		97628-1 (NPTF)	Stainless Steel ANSI 316	1
		97628-2 (BSP)	Stainless Steel ANSI 316	1
		96634-1 (NPTF)	Cast Iron	1
		96634-2 (BSP)	Cast Iron	1
15	Ball (63.5mm dia.)	93358-1	Neoprene	4
		93358-2	Nitrile	4
		93358-3	Viton	4
		93358-4	PTFE	4
		94805	Stainless Steel	4
		93358-C	Hytre	4
		93358-A	Santoprene	4
16	O-ring 85.32*3.53 (ID*Sec.)	Y325-237	Nitrile	4
		Y327-237	Viton	4
		94356	E.P.R.	4
		Y328-237	PTFE	4
17	Seat	95673	Aluminum	4
		94353	Stainless Steel ANSI 316	4
		94328-A	Santoprene	4
		94328-G	Nitrile	4
		95677	Carbon Steel	4
18	Inlet Manifold	96376-1 (NPTF)	Aluminum	1
		96376-2 (BSP)	Aluminum	1
		97630-1 (NPTF)	Stainless Steel ANSI 316	1
		97630-2 (BSP)	Stainless Steel ANSI 316	1
		96633-1 (NPTF)	Cast Iron	1
		96633-2 (BSP)	Cast Iron	1



**PARTS LIST / DP26-50-XXXXXX FLUID SECTION**

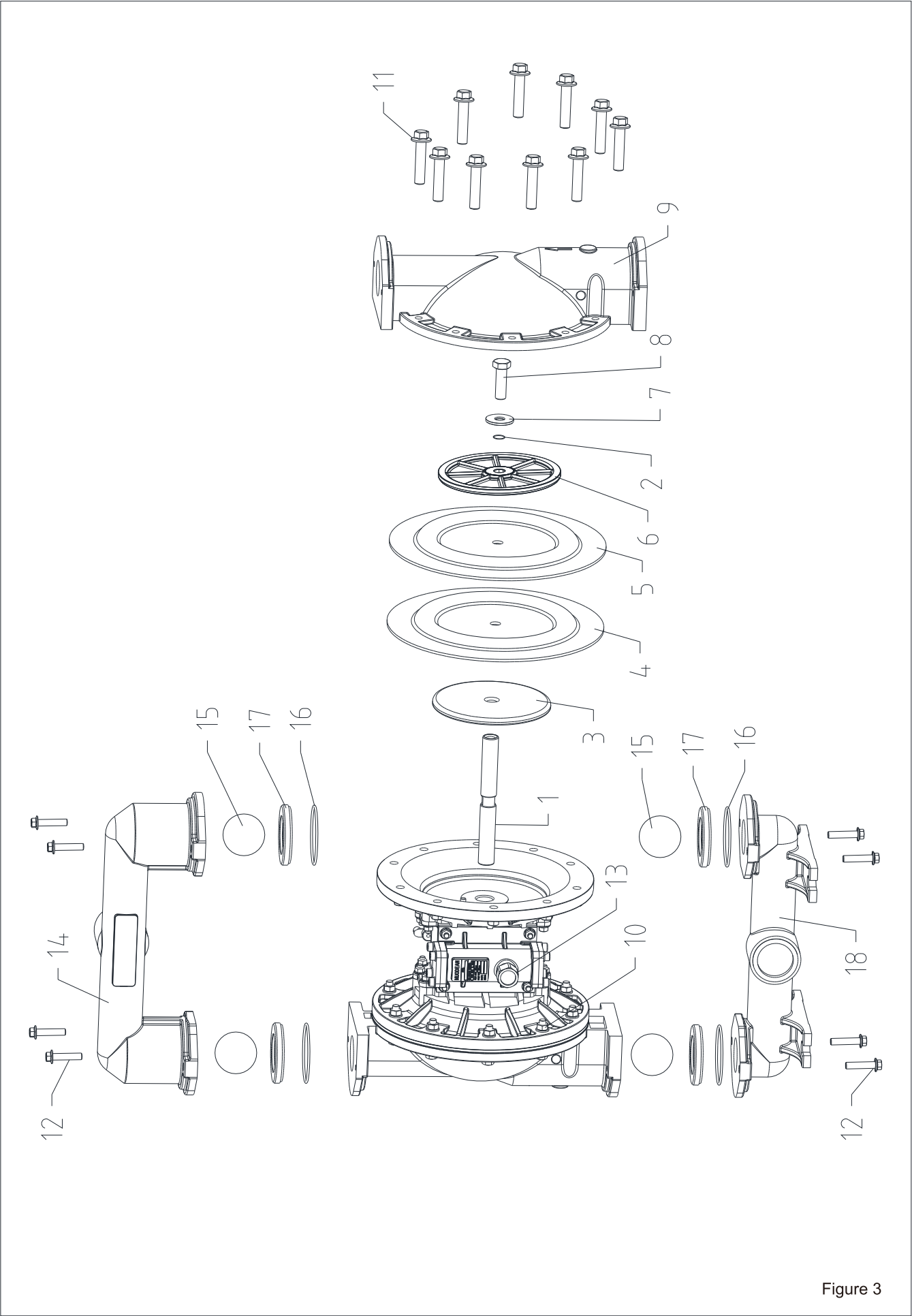


Figure 3

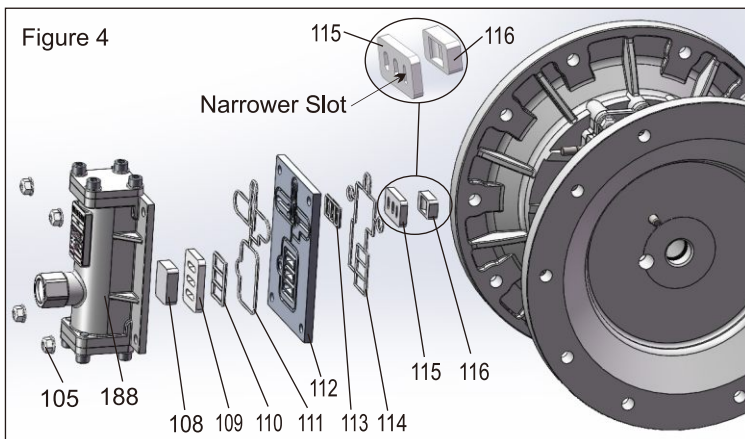
## AIR MOTOR SECTION SERVICE

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) nut and (188) major valve.
2. Remove (108), (109), (110), (111), (112), (113), (114), (115), (116).



3. Remove (118) nut, (145) air cap, (129) air cap, (146) gasket, and (121) gasket.
4. Remove (131) from (117), and remove (130) Y-type rings from (145) & (129).
5. Remove (127) o-rings, (124) pilot pins, (126) retainer rings, and (125) O-rings.
6. Remove (132) spool and (133) Y-type rings.
7. Remove (123) guide bushes and (122) o-rings.

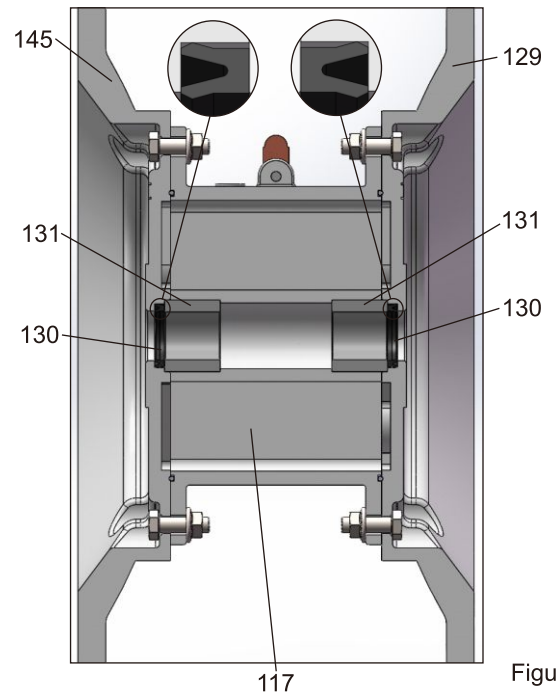
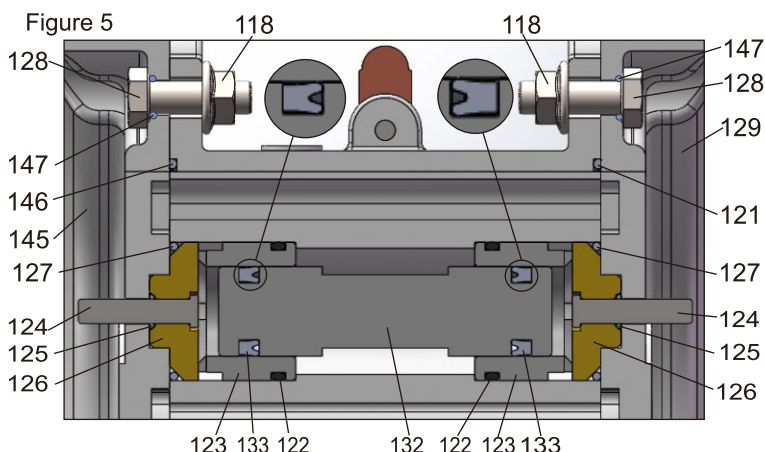


Figure 6

## PILOT VALVE REASSEMBLY

1. Replace all o-rings, Y-type rings and gaskets if worn or damaged. These are (110), (111), (113), (114), (147), (146), (127), (125), (133), (122), (121), (130).
2. Look for deep scratches or damages on sealing surfaces of (108) valve insert and (109) valve plate. If there are scratches or damages, Replace them.  
**Note:** (108) valve insert and (109) valve plate 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.
2. Look for deep scratches or damages on sealing surfaces of (116) valve insert and (115) valve plate. If there are scratches or damages, Replace them.  
**Note:** (116) valve insert and (115) valve plate 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 sufficiently all o-rings and Y-type rings with lubricant grease.
- Lubricate sufficiently the sealing surfaces with lubricant grease, where (109) valve plate and (108) valve insert contact with each other.
- Lubricate sufficiently the sealing surfaces with lubricant grease, where (115) valve plate and (116) valve insert contact with each other.
- Lubricate (124) pilot pins with lubricant grease.
- Pay attention to the orientation of Y-type rings (133) & (130), Must ensure correct installation.
- Pay attention to the orientation of (115) valve plate. Must ensure correct installation.

## MAJOR VALVE DISASSEMBLY

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

## MAJOR VALVE REASSEMBLY

1. Replace all o-rings, Y-type rings and gaskets if worn or damaged. These are (103),(135),(139),(137).
  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) valve plate and (108)valve insert 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) valve insert. Must ensure correct installation.

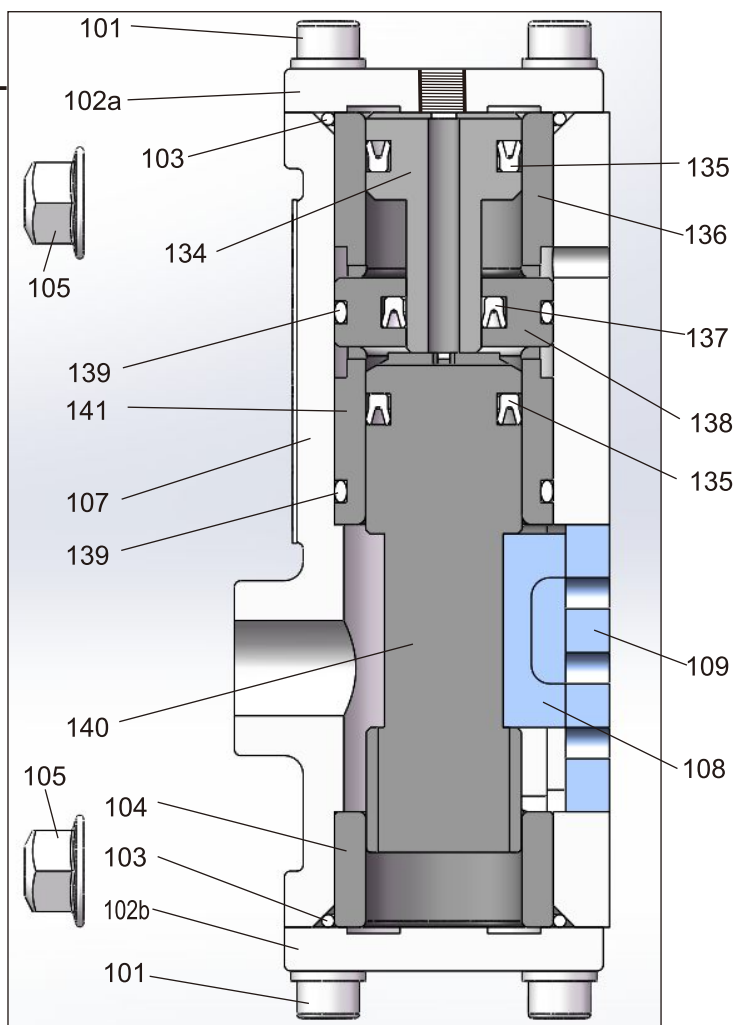


Figure 7

# PARTS LIST / DP26-50-XXXXXX AIR MOTOR SECTION

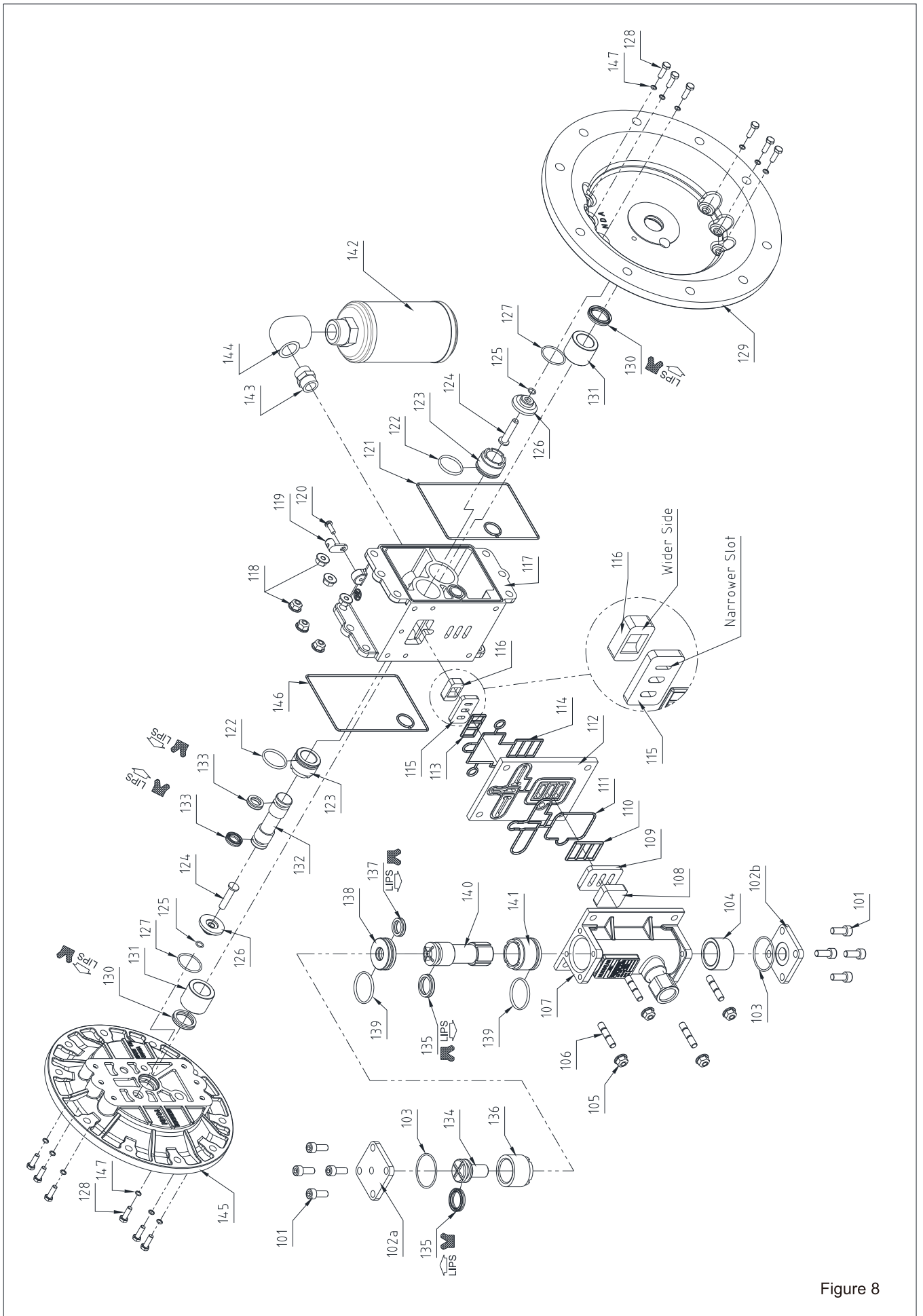


Figure 8

# PARTS LIST / DP26-50-XXXXXX AIR MOTOR SECTION

Position number	Description	Part number	Material	Quantity
101	Screw(M8*12)	NDA-PX43	Steel	8
	Screw(M8*12)	NDA-PX44	Stainless Steel	8
102a	Motor Cap	NDA-PJ72	Stainless Steel	1
102b	Motor Cap	NDA-PJ68	Stainless Steel	1
103	O-Ring 41*2.4(ID*Sec.)	NDA-PY20	Nitrile	2
104	Guide Bush	NDA-PK85	POM	1
105	Nut(M8)	NDA-PX11	Steel	4
	Nut(M8)	NDA-PX12	Stainless Steel	4
106	Screw(M8*40)	NDA-PX13	Steel	4
	Screw(M8*40)	NDA-PX14	Stainless Steel	4
107	Air Valve Body	NDA-PI67	Aluminum	1
108	Valve Insert	NDA-PK92	Ceramic	1
109	Valve Plate	NDA-PK91	Ceramic	1
110	Gasket	NDA-PF76	Nitrile	1
111	Gasket	NDA-PF79	Nitrile	1
112	Adapter Plate	NDA-PN69	Aluminum	1
113	Gasket	NDA-PF78	Nitrile	1
114	Gasket	NDA-PF77	Nitrile	1
115	Valve Plate	NDA-PK94	Ceramic	1
116	Valve Insert	NDA-PK93	Ceramic	1
117	Pump Body	NDA-PA67	Aluminum	1
118	Nut(M8)	NDA-PX11	Steel	12
	Nut(M8)	NDA-PX12	Stainless Steel	12
119	Ground Lug	93004	Copper	1
120	Screw (M5x15)	NDA-PX15	Stainless Steel	1
121	Gasket	NDA-PF87	Nitrile	1
122	O-ring 28*2.65 (ID*Sec.)	NDA-PY21	Nitrile	2
123	Guide Bush	NDA-PK96	POM	2
124	Pilot Pin	NDA-PK138	Stainless Steel	2
125	O-ring 6*1.5 (ID*Sec.)	NDA-PY22	PU/NBR	2
126	Retainer Ring	NDA-PK133	Copper	2
127	O-Ring 28*2.65 (ID*Sec.)	NDA-PY21	Nitrile	2
128	Bolt (M8x25)	NDA-PX25	Steel	12
	Bolt (M8x25)	NDA-PX26	Stainless Steel	12
129	Right Air Cap	NDA-PB105	Aluminum	1
130	Y Seal Ring (24*32*4.5)	NDA-PW22	Nitrile	2
131	Bush	NDA-PG67	POM	2
132	Spool	NDA-PK95	POM	1
133	Y Seal Ring(14*22*4.5)	NDA-PW23	Nitrile	2
134	Shaft	NDA-PK88	POM	1
135	Y Seal Ring(30*22x4.5)	NDA-PW24	Nitrile	2
136	Bush	NDA-PK87	POM	1
137	Y Seal Ring(24*16x4.5)	NDA-PW25	Nitrile	1
138	Retainer Ring	NDA-PK89	POM	1
139	O-ring 36.5*2.65(ID*Sec.)	NDA-PY24	Nitrile	2
140	Spool	NDA-PK86	POM	1
141	Guide Bush	NDA-PK90	POM	1
142	Muffler	XY-12		1
143	Nipple	NDA-PN101	Malleable Iron	1
144	Elbow Adapter	NDA-PN102	Malleable Iron	1
145	Left Air Cap	NDA-PB104	Aluminum	1
146	Gasket	NDA-PF86	Nitrile	1
147	O-ring 7*2 (ID*Sec.)	NDA-PY25	Nitrile	12

# PARTS LIST / DP26-50-XXXXXX EXTERNAL PIPING SECTION

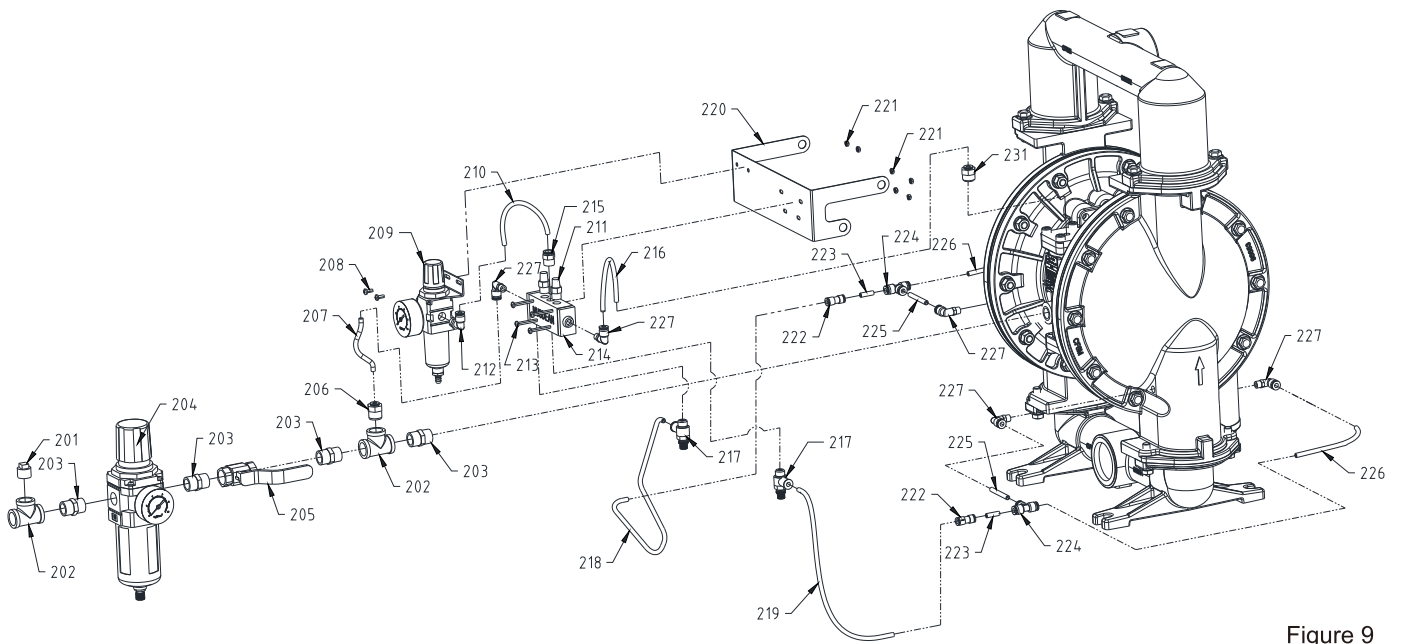


Figure 9

Position number	Description	Part number	Material	Quantity
201	1/2" Plug	NDA-PZ103	Stainless Steel	1
202	1/2" Tee	NDA-PZ104	Stainless Steel	2
203	1/2" Nipple	NDA-PZ105	Stainless Steel	4
204	1/2" Pressure Reducing Valve & Filter	NDA-PZ106	Assembly	1
205	1/2" Ball Valve	NDA-PZ107	Assembly	1
206	Fitting	NDA-PZ108	pneumatic component	1
207	Φ6 Pipe	NDA-PZ109	Plastic	1
208	Screw M4x10	NDA-PX87	Stainless Steel	2
209	1/4" Pressure Reducing Valve & Filter	NDA-PZ110	Assembly	1
210	Φ6 Pipe	NDA-PZ111	Plastic	1
211	1/4" Muffler	NDA-PZ112	pneumatic component	2
212	Fitting	NDA-PZ113	pneumatic component	1
213	Screw M4x35	NDA-PX88	Stainless Steel	4
214	Reversing Valve	NDA-PZ114	Assembly	1
215	Fitting	NDA-PZ115	pneumatic component	1
216	Φ6 Pipe	NDA-PZ116	Plastic	1
217	1/4" Throttle Valve	NDA-PZ117	Assembly	2
218	Φ6 Pipe	NDA-PZ118	Plastic	1
219	Φ6 Pipe	NDA-PZ119	Plastic	1
220	Panel	NDA-PN128	Stainless Steel	1
221	Nut M4	NDA-PX89	Stainless Steel	6
222	Check Valve	NDA-PZ120	Assembly	2
223	Φ6 Pipe	NDA-PZ121	Plastic	2
224	Tee	NDA-PZ122	pneumatic component	2
225	Φ6 Pipe	NDA-PZ123	Plastic	2
226	Φ6 Pipe	NDA-PZ124	Plastic	2
227	Fitting	NDA-PZ125	pneumatic component	6
228	Fitting	NDA-PZ108	pneumatic component	1
229	Fitting	NDA-PZ127	pneumatic component	1
230	Φ6 Pipe	NDA-PZ128	Plastic	1
231	Fitting	NDA-PZ137	pneumatic component	1

# 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

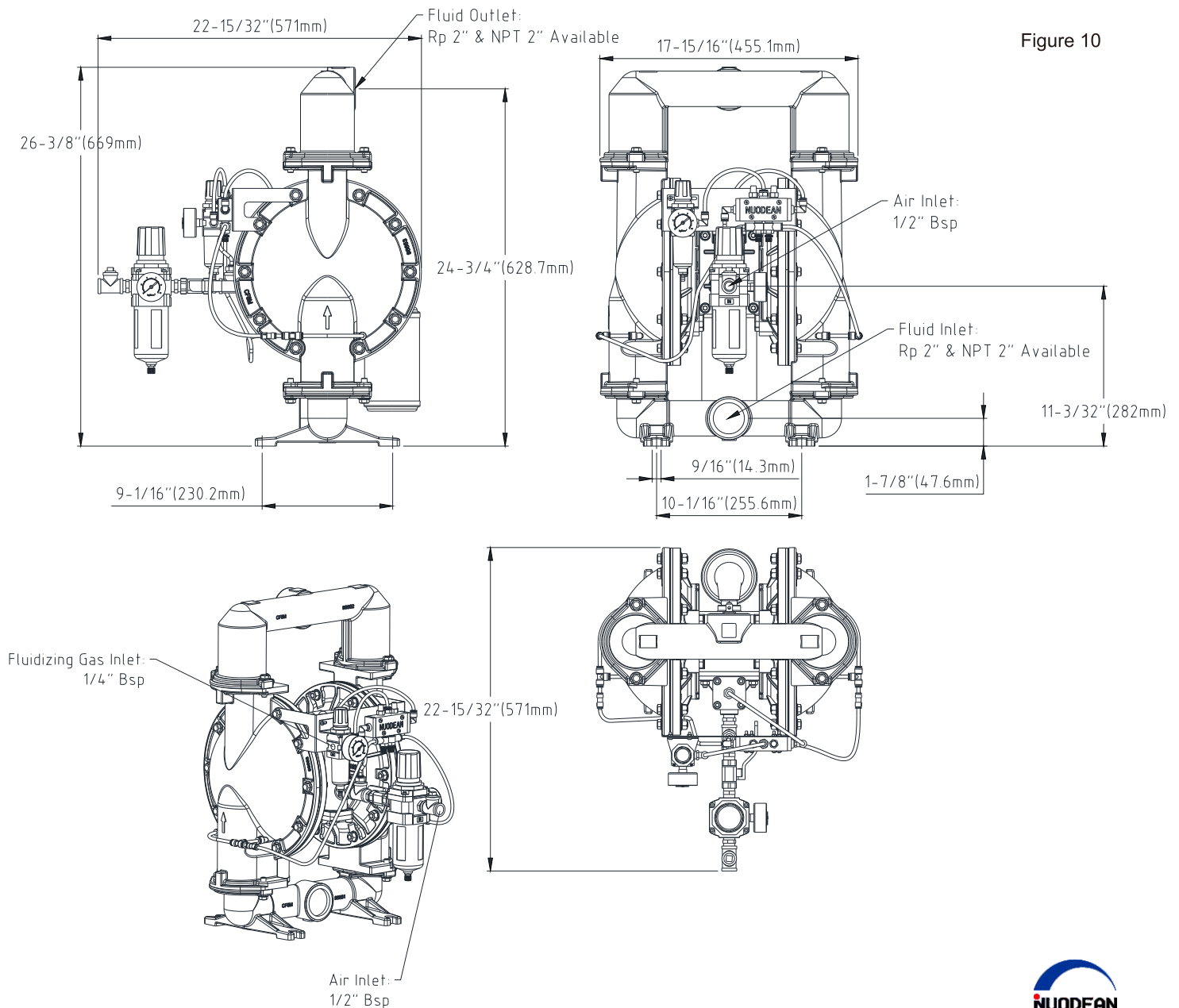


Figure 10

