OPERATING & SERVICE MANUAL AZ-1-107-NL SERIES PUMP

USA EDITION

hydratron

specializing in high pressure equipment for industry

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in the design
and manufacture of high pressure
equipment for industry

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SECTION 1 AZ-1 SERIES PUMP INSTALLATION INSTRUCTIONS

1.1 MOUNTING THE PUMP

2-off 3/8"-24 UNF tapped holes are located on the base of the hydraulic cylinder and supplied with ¾" long mounting bolts, washers and spring washers for panel mounting up to a max thickness of 1/4" (6mm).

1.2 FLUID SUPPLY CONNECTION

Make a suitable flexible or hard piped connection to the threaded fluid inlet port, marked "fluid in" on check valve body. (Size of thread shown on page 8). Use PTFE tape or suitable anti-seize compound to prevent galling of the threads and ensure all connections are leak free.
All connections to this port should be the same size or larger, as smaller size fittings, hoses, etc. can cause a restricted flow supply.
The installation of a 100 mesh screen (140 micron) fluid filter, or finer is recommended, located between the fluid reservoir and fluid inlet port and that the location of the fluid reservoir be above or level with the pump to ensure a flooded condition at the fluid inlet port.
Note. Standard pumps are supplied with NITRILE hydraulic seals suitable for oil, water, methanol and glycol service. Ensure that the fluid to be pumped is compatible with this material prior to use. For other process applications Viton and Chemraz hydraulic seal kits are available.

1.3 PRESSURE PORT CONNECTION

Make a suitably rated flexible or hard piped connection to the threaded fluid outlet port, marked "fluid out" on check valve body. (Size of thread shown on page 8). Use PTFE tape or suitable anti-seize compound to prevent galling of the threads and ensure all connections are leak free.
Connect a suitably rated gauge and a bleed valve or vent plug at the highest point in the circuit for purging air from the circuit.
Note *- hydraulic hoses or piping including adaptors or couplings must have a pressure rating equal to or more than the maximum output pressure of the pump.*

1.4 AIR SUPPLY CONNECTION

Make a suitable flexible or hard piped connection to the ½"NPT air supply port, marked "air in". Use PTFE tape or suitable anti-seize compound to prevent galling of the threads and ensure all connections are leak free.
To ensure maximum performance, ½" NPT air supply components are required as smaller sizes will reduce the flow.
The pump is designed to operate on air pressure from 10 to 100 PSI, unless it is a low pressure start (LPS) model when it will operate from 5 to 100 PSI.
To control the pump an air filter and regulator is required (not supplied)
It is recommended an isolation valve (not supplied) is fitted between the air filter/regulator unit and the pump.
NOTE - It is not necessary to fit an air line lubricator as the pump is a NON-LUBE version and internally lubricated with NL SUPERLUBE GREASE.
Note - DO NOT EXCEED 100 PSI AIR SUPPLY

1.5 MUFFLING THE EXHAUST

It is recommended a muffler is fitted to the ¾"NPT 'air out' port to reduce the operating noise of the pump. The muffler can be screwed directly into the ¾" NPT port or piped away. Do not fit a smaller muffler than ¾"NPT as this can reduce the speed of the pump. Use PTFE tape or suitable anti-seize compound to prevent galling of the threads and ensure all connections are leak free.

SECTION 2 AZ-1 SERIES PUMP OPERATING INSTRUCTIONS

2.0 BEGINNING OPERATION

2.01 Attach a 100 psi maximum air supply

2.02 Rotate air regulator control knob anti-clockwise until handle becomes free and air gauge reads 0 psi and connect an air supply – 100 PSI maximum.

2.03 Open air supply isolation valve (if fitted)

2.04 Rotate air regulator control knob slowly clockwise until pump begins to reciprocate (pump should start at 10 to 15 PSI under normal conditions)

2.05 Rotate air regulator control knob clockwise until 25 to 30 PSI is reached on the air gauge and run pump until all air is purged out of the circuit.
When pressure testing, bleed all air out of the item being tested before pressurising by fitting a bleed valve or vent plug at the highest point in the circuit. Care should be taken to take account of any internal cavities that may trap air inside the circuit.

2.06 Rotate air regulator control knob anti-clockwise until zero pressure is reached on air gauge

2.07 Close any vent valves once all air is purged from the system

2.08 Rotate air regulator control knob slowly clockwise until required hydraulic pressure is reached on the high pressure gauge
Note *- If the object being tested is large it will take a while before the pressure builds up in the system and registers on the pressure gauge. Do not set the air driving pressure too high if unattended as this may lead to the object under test being over pressurised.*

- *Approximate hydraulic output pressure can be preset by air drive pressure. See pump specification sheet.*
- *Air drive pressure can be preset by closing an air line isolation valve fitted between the regulator and pump closing air stop valve and rotating air regulator valve clockwise until the required pressure is registered on air pressure gauge.*
- *Air pressure should be set slightly below the required setting so that it can be raised to the correct setting once hydraulic pressure has built up and the pump has stalled out.*
  The pump can then be started and stopped by using an air stop valve as it will go to the preset output pressure each time it is started.
  Once set the pump will maintain the set pressure indefinitely and make up any fluid losses within the hydraulic system automatically.

SECTION 3 STANDARD AZ-1 SERIES PUMP FAULT FINDING

- **PUMP WILL NOT STROKE**

Possible Cause	Remedy
Air regulator not set correctly	Check air drive pressure and re-set regulator if necessary
Air motor piston seal leaking	See Section 4.3
Air motor pilot valve seal failure	See Section 4.4
Air motor slide valve stuck	See Section 4.3
Air motor slide valve seal failure	See Section 4.3
Air motor check valve seal failure	See Section 4.4

- **LOSS OF HIGH PRESSURE**

Possible Cause	Remedy
Hydraulic check valves seal failure	See Section 4.6 and 4.7
Hydraulic piston seal failure	See Section 4.2

- **PUMP RUNNING ERRATICALLY**

Possible Cause	Remedy
Tank fluid level low	Refill tank with clean liquid

SECTION 4 AZ-1-5 TO 107 SERIES PUMP SERVICING INSTRUCTIONS

4.1 REMOVING PUMP

4.11 Note orientation of the air motor top casing air inlet and exhaust connections in relation to hydraulic inlet and outlet check valve connections.
4.12 Disconnect air supply line
4.13 Ensure all hydraulic pressure is released from system
4.14 Disconnect air supply pipe work to pump air inlet
4.15 Disconnect pipe work to inlet and outlet check valves
4.17 From underneath the pump unscrew mounting screws
4.18 Withdraw complete pump
4.19 Refer to section 4.5

4.2 REPLACING THE HYDRAULIC PISTON SEAL (using Hydraulic Seal Replacement Kit)

4.21 Refer to section 4.1
4.22 Loosen screw (21) located in air motor bottom casting.
4.23 Unscrew air motor anti clockwise from hydraulic cylinder (47), note the hydraulic piston will be removed with the air motor
4.24 Replace hydraulic packing consisting of 1-off O-ring (45) and 2-off PTFE back up rings (44)
4.25 Lubricate O-ring with clean NL SUPERLUBE GREASE (see spares list)
4.26 Replace air motor to hydraulic cylinder gasket (43)
4.27 Carefully relocate piston into hydraulic cylinder and firmly screw air motor back onto cylinder to its original orientation.
4.28 Tighten screw (21).
4.29 Refer to section 4.5.

4.3 SERVICING THE AIR MOTOR (using SKAZAIR – Air Motor Seal Replacement Kit)

4.31 Refer to section 4.1
4.32 Remove air motor retaining bolts (1) and separate top casting assembly from bottom casting. Replace air piston O-ring (16), (14) and 2 x air cylinder O-rings (12).
4.33 Remove retaining ring (18), withdraw hydraulic piston (42) from air piston (15) and push pilot valve assembly (17) out through the bottom of the air piston.
4.34 **To service the pilot valve (17) and integral check valve (25) refer to section 4.4**
4.35 Remove retaining ring (11) and remove the bearing assembly (9). Replace O-ring (8) and (10).
Note – The bearing assembly has a moulded rubber seat on one side, if the rubber is damaged, a new bearing assembly is required
4.36 **Do not remove** slide valve sleeve (23) unless a complete new slide valve assembly (6) is being installed. (The valve and sleeve are precision ground and easily damaged if removed from the head casting).
4.37 Replace 2 x O-rings (4) located inside slide valve inner sleeve (23) and the air motor casting (2)
4.38 If replacing the slide valve due to wear or damage remove inner sleeve (23), outer sleeve (24) and 4 x O-rings (22). If damaged replace piston bumper (3) and valve bumper (5) located in top casting. (note item (3) and (5) are not part of the air motor seal replacement kit).
When replacing a new slide valve assembly (6), locate 4 x O-rings (22), ensure spring (7) is in position and carefully locate outer and inner sleeve into top casting as one unit to prevent damage
4.39 Refer to section 4.5

4.4 SERVICING THE PILOT VALVE (17) AND INTEGRAL CHECK VALVE (25)

4.41 Refer to section 4.31 to 4.34
4.42 Remove retaining ring (30)
4.43 Unscrew seat (29). The check valve assembly (25) and spring (28) will drop out.
4.44 Replace O-rings (4) & (27) on pilot valve body
4.45 Replace check valve O-ring (36). If check valve is damaged replace as a complete assembly (25)
4.46 Refer to section 4.5

4.5 RE-ASSEMBLING THE PUMP

4.51 Re-assembly is opposite procedure to disassembly
4.52 Lubricate new O- rings and bumpers with NL SUPERLUBE GREASE (see spares list)
4.53 If reassembling the air motor ensure the air cylinder (13) is positioned correctly and tightly against the top and bottom casting BEFORE tightening the bolts.
4.54 Secure all bolts hand tight, followed by an opposite tightening sequence to a torque of 10-12 ft/lbs
4.55 Refit pump and connect pipe work in an opposite procedure to disassembly, refer to section 4.1. Test air and hydraulic pipe joints for leakage.

4.6 SERVICING THE INLET CHECK VALVE (using Inlet Check Valve Spares Kit)

4.61 Refer to section 4.1
4.61 Remove check valve assembly (49) from hydraulic cylinder (47)
4.62 Remove retaining ring (58) and replace spring guide (59), spring (60), ball guide (61), ball (62) and O-ring (63)
4.63 Check body for damage and replace if necessary (note – not part of spares kit)
4.64 Refer to section 4.5

4.7 SERVICING THE OUTLET CHECK VALVE (using Outlet Check Valve Spares Kit)

4.71 Refer to section 4.1
4.72 Remove retaining ring (51) and replace spring guide (52), spring (53), ball guide (54), ball (55) and O-ring (56)
4.73 Check body for damage and replace if necessary (note – not part of spares kit)
4.74 Refer to section 4.5

AZ-1-107-NL TECHNICAL SPECIFICATION

HYDRAULIC PRESSURE – STATIC CONDITION

AIR PRESSURE	PSI	10	20	30	40	50	60	70	80	90	100
	Bar	0.7	1.4	2.1	2.8	3.5	4.1	4.8	5.5	6.2	6.9
HYDRAULIC PRESSURE	PSI	900	2,000	3,150	4,200	5,400	6,400	7,450	8,500	9,700	10,700
	Bar	62	138	217	290	372	441	514	586	669	738

APPROXIMATE RATE OF DISCHARGE

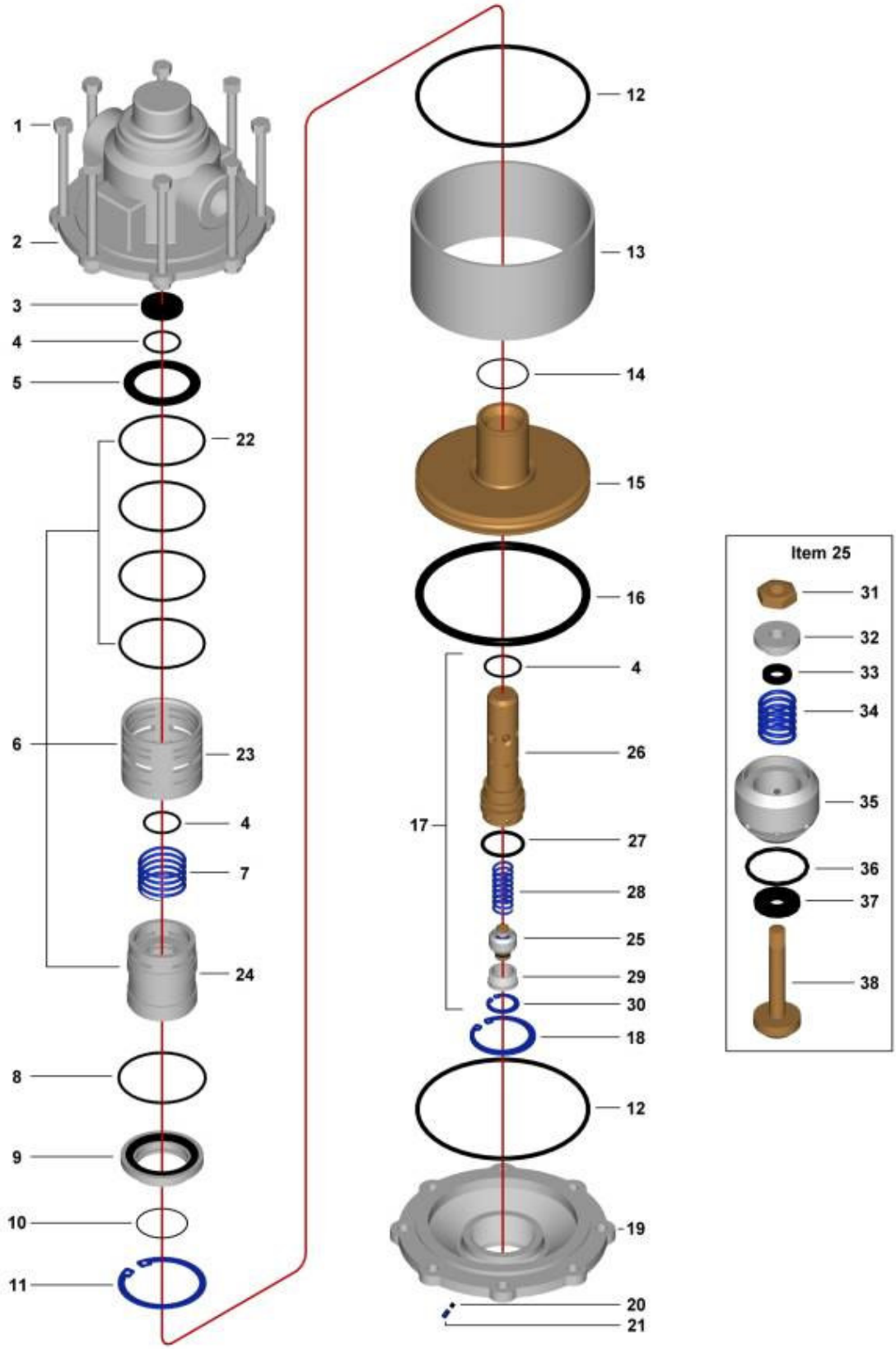
		APPROXIMATE RATE OF DISCHARGE					
OUTPUT PRESSURE		60 PSI (4.1 Bar)		80 PSI (5.5 Bar)		100 PSI (6.9 Bar)	
PSI	Bar	Ins^3 per min	Ltr per min	Ins^3 per min	Ltr per min	Ins^3 per min	Ltr per min
0	0	95	1.56	110	1.8	120	1.97
1,000	69	69	1.13	74	1.21	78	1.28
2,000	138	61	1	68	1.11	74	1.21
3,000	207	53	0.87	63	1.03	71	1.16
4,000	241	46	0.75	58	0.95	62	1.02
6,000	414	26	0.43	45	0.74	54	0.89
8,000	552	0	0	28	0.46	44	0.72
9,000	621	0	0	0	0	38	0.62
10,000	690	0	0	0	0	27	0.44
12,500	862	0	0	0	0	0	0

MATERIALS OF CONSTRUCTION

- Air Motor – Mainly anodised aluminium with wound composite air cylinder, carbon steel zinc plated tie rods.
- Hydraulic Section - Aluminium bronze cylinder (unless 300 series stainless steel requested), 300 series stainless steel Chrome plated piston, 300 series stainless steel check valve bodies and check valve internals, except balls, which are 440C stainless steel.
- Nitrile seals suitable for water, oil, methanol and glycol service fitted. (viton, ethylene propylene or chemraz seal kits available).

INLET THREAD – ½" NPT **OUTLET THREAD** – ½" NPT

AZ-1 SERIES PUMP AIR MOTOR ASSEMBLY
(Lubricated with NL SUPERLUBE GREASE)

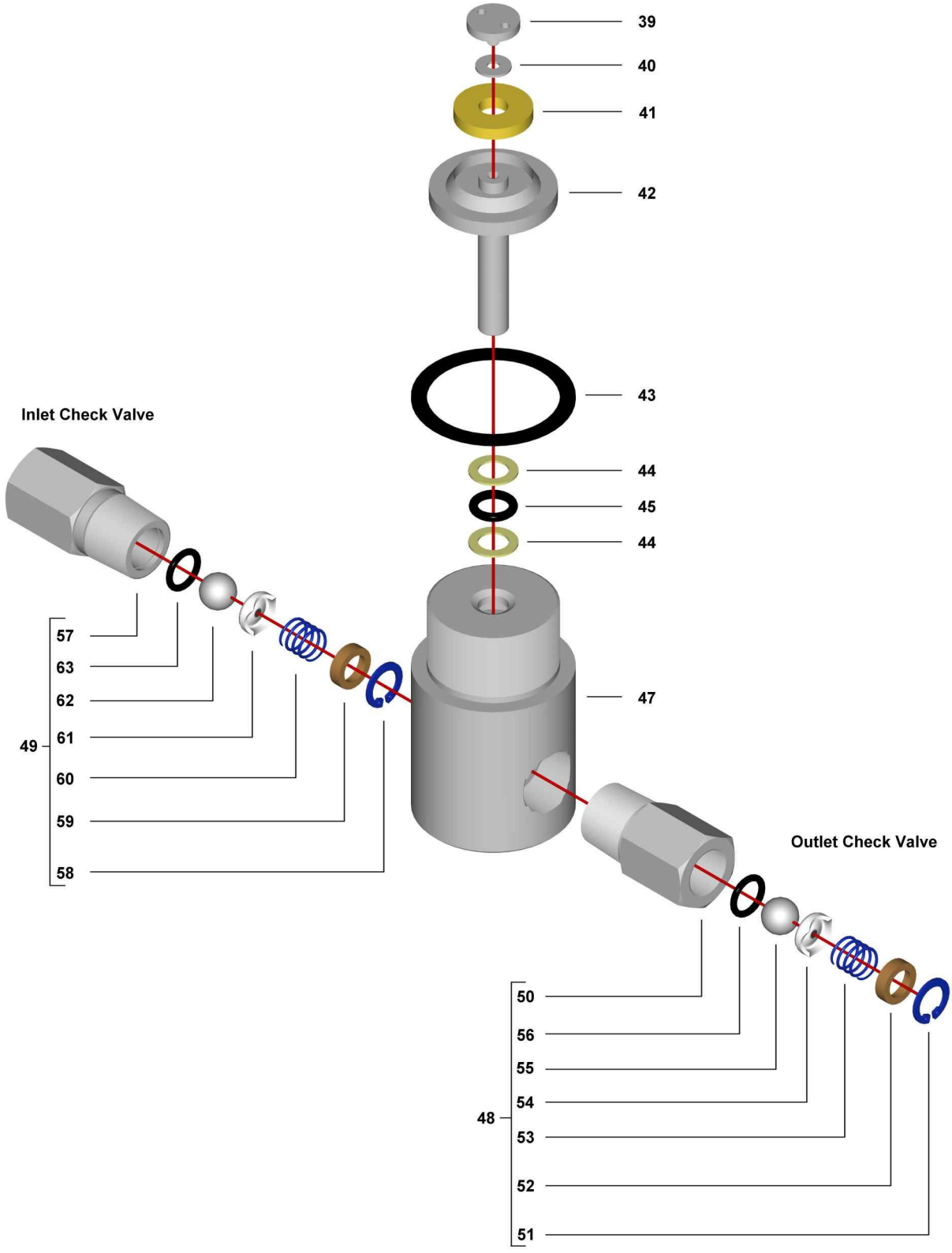


AZ-1 SERIES PUMP AIR MOTOR PARTSLIST

Item	Qty	Part code	Description
1	8	5/16-18x4” (5/16”-18NUT)	BOLT (nut is a separate item)
2	1	P-1-1	HEAD CASTING
3	1	P-1-12	PISTON BUMPER
4	2	6227-19	O RING
5	1	P-1-57	VALVE BUMPER
6	1	P-1-111	SLIDE VALVE ASSEMBLY
7	1	P-1-5	SPRING
8	1	6230-9	O RING
9	1	P-1-47	BEARING ASSY
10	1	6230-1	O RING
11	1	RRT262	SPIROLOK RING
12	2	6230-30	O RING
13	1	P-1-4	AIR CYLINDER
14	1	28775-028	O RING
15	1	P-1-48	AIR PISTON
16	1	6227-56	O RING
17	1	P-1-60	PILOT VALVE ASSEMBLY
18	1	RRT200	HEAVY DUTY CIRCLIP
19	1	P-1-7-A	BOTTOM CASTING
20	1	3/16”LG SECTION ORING	BUNG
21	1	1/4-20x5/16 SET SCREW	GRUB SCREW
ITEM 6 - SLIDE VALVE ASSY (P-1-111)			
22	4	28775-144	O RING
23	1	P-1-2	INNER SLIDE VALVE
24	1	P-1-3	SLIDE VALVE BODY
ITEM 17 - PILOT VALVE ASSEMBLY (P-1-60)			
25	1	P-1-A-32	CHECK VALVE ASSEMBLY
4	1	6227-19	O RING
26	1	P-1-49	PILOT VALVE BODY
27	1	6227-21	O RING
28	1	P-1-16	SPRING
29	1	P-1-A-24	SEAT
30	1	RRT093	SPIROLOK RING
ITEM 25 – CHECK VALVE ASSEMBLY (P-1-A-32)			
31	1	8/32	NUT
32	1	P-1-39	WASHER
33	1	P-1-43	WASHER
34	1	P-1-15	SPRING
35	1	P-1-A-28	POPPET BODY
36	1	6227-9	O RING
37	1	P-1-A-25	WASHER
38	1	P-1-56	CENTRE SCREW

AZ-1-5-NL TO 107-NL SERIES PUMP HYDRAULIC ASSEMBLY

(Lubricated with NL SUPERLUBE GREASE)



P-1-26-107-NL AZ-1-107-NL HYDRAULIC ASSEMBLY PARTSLIST

Item	Qty	Part code	Description
39	1	P-1-149	PISTON NUT
40	1	P-1-150	PISTON WASHER
41	1	P-1-51	PISTON BUMPER
42	1	P-1-10-107	HYDRAULIC PISTON
43	1	P-1-28	GASKET
44	2	MS28782-10	BACK UP RING
45	1	6227/10-V	O RING
47	1	P-1-11-107-SF	HYDRAULIC CYLINDER
48	1	P-1-23	OUTLET CHECK VALVE ASSEMBLY
49	1	P-1-24	INLET CHECK VALVE ASSEMBLY
ITEM 48 - OUTLET CHECK VALVE ASSEMBLY (P-1-23)			
50	1	P-1-20	BODY
51	1	RRT68	RETAINING RING
52	1	P-1-17	SPRING GUIDE
53	1	P-1-13	SPRING
54	1	P-1-34-2	BALL GUIDE
55	1	9/16BALL	BALL
56	1	6227-10-V	O RING
ITEM 49 - INLET CHECK VALVE ASSEMBLY (P-1-24)			
57	1	P-1-20	BODY
58	1	RRT68	RETAINING RING
59	1	P-1-17	SPRING GUIDE
60	1	P-1-13	SPRING
61	1	P-1-34-2	BALL GUIDE
62	1	9/16BALL	BALL
63	1	6227-10-V	O RING

Check Valve components sold separately if required

AZ-1-107-NL SPARES KITS (USA)

P-1-124-107 COMPLETE REDRESS KIT

Item	Qty	Partcode	Description
4	3	6227-19	O RING
5	1	P-1-57	VALVE BUMPER
8	1	6230-9	O RING
10	1	6230-1	O RING
12	2	6230-30	O RING
14	1	28775-028	O RING
16	1	6227-56	O RING
18	1	RRT200	HEAVY DUTY CIRCLIP
25	1	P-1-A-32	CHECK VALVE ASSEMBLY
27	1	6227-21	O RING
28	1	P-1-16	SPRING
30	1	RRT093	SPIROLOK RING
40	1	P-1-150	PISTON WASHER
41	1	P-1-51	PISTON BUMPER
43	1	P-1-28	GASKET
44	2	MS28782-10	BACK UP RING
45	1	6227/10-V	O RING
51	1	RRT68	RETAINING RING
56	1	6227/10-V	O RING
58	1	RRT68	RETAINING RING
63	1	6227/10-V	O RING

P-1-124 AIR DRIVE REDRESS KIT

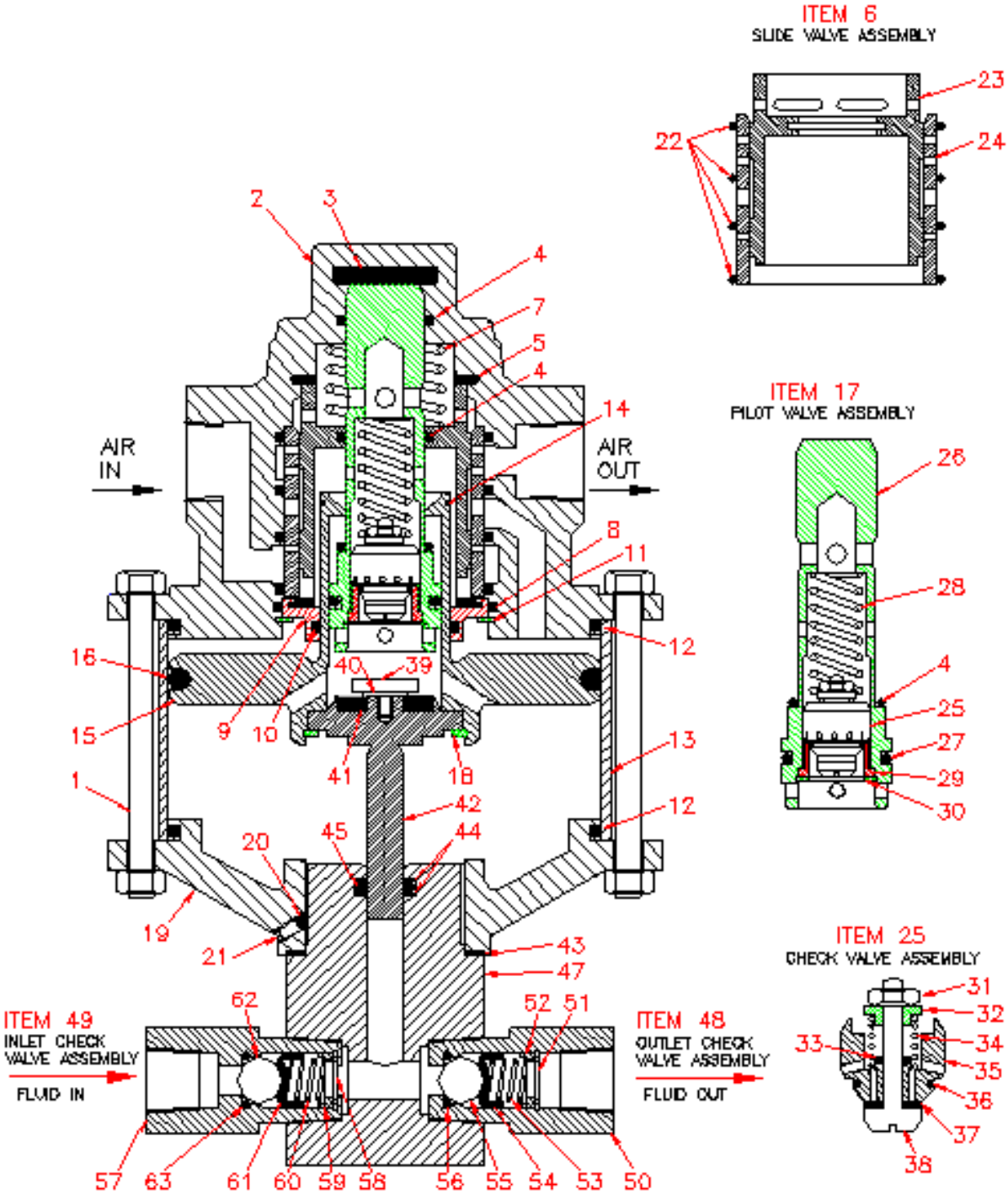
Item	Qty	Partcode	Description
4	3	6227-19	O RING
5	1	P-1-57	VALVE BUMPER
8	1	6230-9	O RING
10	1	6230-1	O RING
12	2	6230-30	O RING
14	1	28775-028	O RING
16	1	6227-56	O RING
18	1	RRT200	HEAVY DUTY CIRCLIP
25	1	P-1-A-32	CHECK VALVE ASSEMBLY
27	1	6227-21	O RING
28	1	P-1-16	SPRING
30	1	RRT093	SPIROLOK RING

P-1-124-107-HYD END ONLY HYDRAULIC REDRESS KIT

Item	Qty	Partcode	Description
40	1	P-1-150	PISTON WASHER
41	1	P-1-51	PISTON BUMPER
43	1	P-1-28	GASKET
44	2	MS28782-10	BACK UP RING
45	1	6227-10	O RING
51	1	RRT68	RETAINING RING
56	1	6227-10	CV O RING
58	1	RRT68	RETAINING RING
63	1	6227-10	O RING

NL SUPERLUBE GREASE – 1 oz GREASE POT

AZ-1-107-NF SERIES PUMP
(Lubricated with NL SUPERLUBE GREASE)



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