Liquiflo

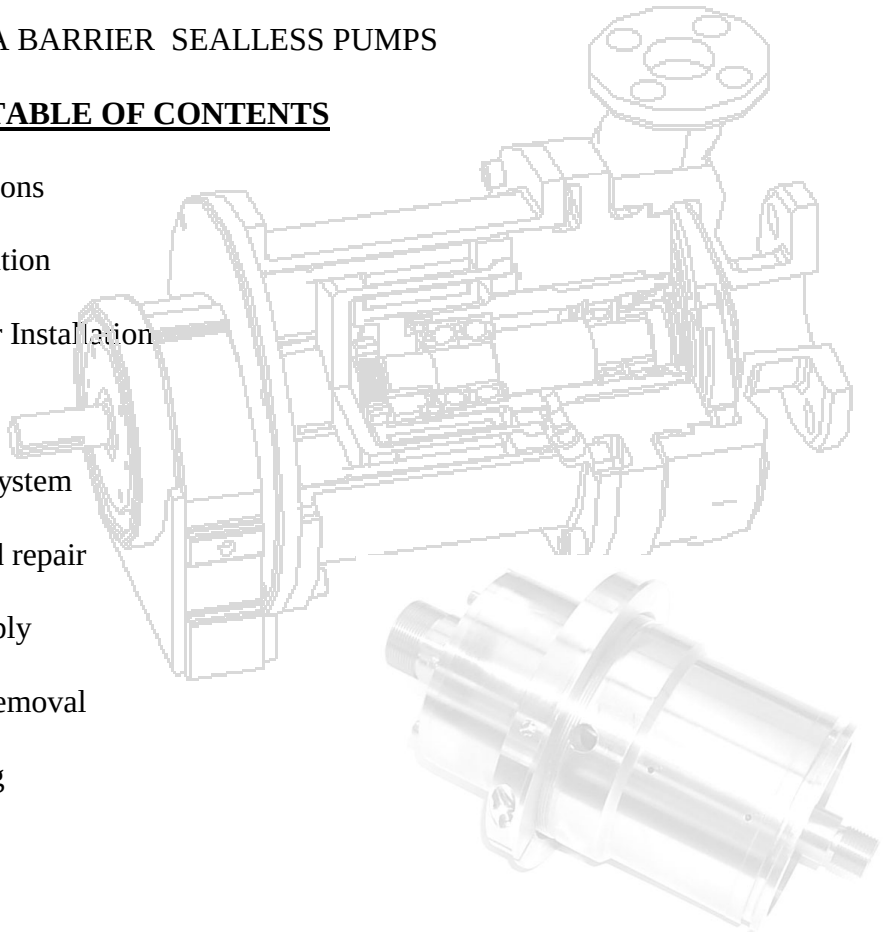
EQUIPMENT COMPANY

INSTALLATION and **MAINTENANCE MANUAL**

Group 2 AB series

ENDURA BARRIER SEALLESS PUMPS

TABLE OF CONTENTS



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Document No.3.02.001

GENERAL INSTRUTIONS

This Manual covers the Group 2 series Mag drive pumps.

Upon receipt of your Liquiflo pump verify:

A) The equipment has not been damaged in transit.

B) The pump model number and serial number are stamped on the nameplate

RECORD **Model**:_____ **Serial No**._____

SYMBOL EXPLANATION

A) Work Safety Symbol

This symbol indicates remarks applicable to operational safety, where injury of personnel may be posed. All cautions should be passed on to other users.

B) Attention Symbol

ATTENTION Special attention must be paid in order to avoid damage to the pump and/or other plant equipment.

LIST OF TOOLS

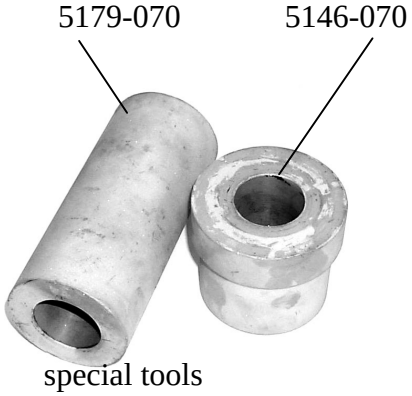
Allen wrench set
(5/32 to 1/2)

1 5/16 socket

8” adjustable

PIN SPANNER

Safety glasses



special tools
(may be obtained from authorized distributor)

INSTALLATION OF PUMP AND MOTOR ASSEMBLY

ATTENTION All items included in this section.

The following should be observed for proper installation of the pump.

A) Pump should be accessible for servicing and inspection.

B) The foundation area should be rigid and level for maintaining pump alignment.

C) The inlet should be as close to the liquid source as practical and preferably below it.

D) Piping should be supported. **Do not use** the pump as a pipe hanger.

E) Install valves to isolate the pump during maintenance.

F) Suction and discharge piping should be the same size or larger than the inlet and outlet ports.

G) Clean piping as necessary to remove dirt, grit, weld slag, etc.

H) If the pump was delivered as a complete assembly, it was properly aligned at the factory. Alignment should be checked by taking measurements at the coupling. Flexible couplings are not intended to compensate for misalignment. Therefore, both angularity and parallelism should be checked and corrected. If these are off, by more than 0.005 inches , the assembly should be realigned.

I) For further instructions on mounting or installing your pump, refer to the Hydraulics Institute Handbook

ATTENTION DO NOT OPEN SUCTION OR DISCHARGE VALVES

START UP PRELIMINARY

Make sure panel does not leak:

Connect panel to nitrogen supply line, but do not connect to the pump: have the panel outgoing tubing blanked off. Turn nitrogen supply on, and set the gas pressure inside the panel(as read by the pressure regulator) to 80 psig. Initially, the ball inside the gas meter may top off: gently tap the top of the flow meter , and the ball will settle down. There should be no leaks , and the gas flow meter will read zero-the ball will settle at the bottom of the scale.

Turn off nitrogen, and connect the panel to the pump. Turn nitrogen on. After the in-rush of gas and equalization of pressure the flow meter ball will settle toward the bottom (20 units or less of flow is acceptable).

START UP

BE CERTAIN MOTOR IS LOCKED OUT

1- Check gas pressure setting.

2- Open suction and discharge valves.

3- Check unit for leaks.

4- Rotate unit by hand.

5- Be certain guards are in place.

6- Remove motor lock out.

7- Jog pump to check rotation.

8- Energize unit and observe the gas meter: the ball should start rising slowly within 10-15 seconds, and settle between 30-120 units of scale.

RUNNING

1-Observe discharge and suction gages and continue monitoring gas flow meter and gas pressure gage. Gas flow may drift and should be adjusted to a mid range flow using the panel pressure regulator.

2-Monitor the unit for 15 minutes to make certain it is operating satisfactorily.

a) Check suction and discharge gages.

b) Check gas flow meter.

c) Check for unusual sound or vibration.

SHUTDOWN-SHORT TERM

1-Stop unit

2-Lock out motor

3-Leave suction or discharge valves open (or both)

4-Leave gas pressure to pump on

5-Monitor gas flow meter

SHUTDOWN-LONG TERM

When gas pressure is to be removed.

1-Stop unit

2-Lock out motor

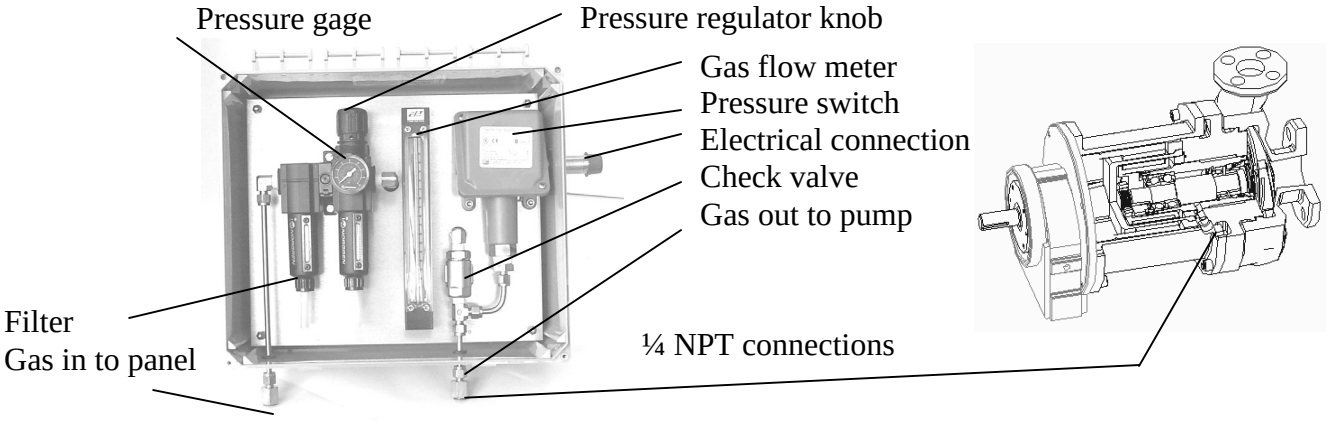
3-Close and lock out suction and discharge valves

4- Drain pump

5-Remove gas pressure

BARRIER SEAL OPERATION

The BARRIER gas seal uses pressurized gas (typically nitrogen) to provide “lift off” between seal faces, allowing them to operate without mechanical contact. When the pump is idle the seal faces are shut, and supported by gas pressure, prevent pumpage from entering the containment shell. The gas support system is shown below



ATTENTION Gas supply must provide pressure to the containment shell at all times. If the pump is to be shut down, the pump must be isolated and drained prior to turning off the gas supply.

The required gas pressure must be 65 psi above pump suction pressure, but not to exceed 100 psi. For higher suction pressure applications consult the factory.

GAS SUPPLY SYSTEM :

Provide the gas panel with 100 psi max of clean dry nitrogen or other inert gas.

The first instrument inside the panel is a filter followed by a low pressure regulator. Pressure to the BARRIER is adjusted by this regulator. Rotate the knob clockwise to increase pressure and counterclockwise to reduce gas pressure. Push in on the regulator knob to lock its setting.

Gas flow meter follows the pressure regulator. It measures flow in units, which also depends on gas pressure. The maximum allowable flow is 120 units. If this flow cannot be reduced by adjusting the pressure regulator, then the unit should be isolated and scheduled for maintenance.

NOTE Approximate conversion to standard cubic feet per minute (scfm)is:

$$SCFM \equiv \left(Scale\,\mathrm{Re}\,ading \times \sqrt{Gas\,\mathrm{Pr}\,essure(abs) \div 14.7}\right) \div 28310$$

Example: If meter reads 50 units and gas pressure is 70 psig (i.e. 84.7 psia),then the gas flow in standard units is :

$$SCFM \equiv \left(50 \times \sqrt{84.7/14.7}\right)/\,28310 \equiv .004(typical)$$

The pressure switch provided may be installed to shut the pump down or to signal the operator of possible problems. Explosion proof switches are larger than the space in the standard panel and are mounted outside the panel.

NOTE : Panel rating NEMA 12/4X

MAINTENANCE AND REPAIR

The pump has internal bearings , which require replacement over time.

The selection of a seal-less pump may have been due to a concern for leakage of hazardous liquids. When performing maintenance on this pump, cautionary steps should be taken to ensure proper drainage or cleansing of the liquid inside the pump prior to disassembly.

WORK SAFETY

Magnetic drive pumps contain strong magnets, which pose health risks. Based on this the following must be observed.

A) Individuals with cardiac pacemakers should avoid repairs on these units.

B) Individuals with internal wound clips, metallic wiring, or other metallic prosthetic devices should avoid repairs on these units.

C) Strong magnetic field can cause tools and parts to slam together; injuring hands and fingers.

Keep magnets away from credit cards, computers, computer discs and watches.

ATTENTION

REMOVAL FROM SYSTEM

When the pump is handling flammable, toxic or hazardous fluid, flush the pump prior to removal from the piping system. Prior to flushing and disassembly consult the Material Safety Data Sheet (MSDS) for the pumped fluid to ensure procedures and precautions as specified are adhered to. Exercise extreme care to avoid contact with the fluid.

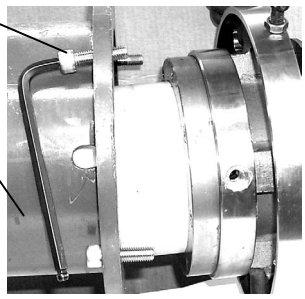
ATTENTION

MAINTENANCE

Flush the pump by removing the 1/2-inch NPT pipe plug from the casing.

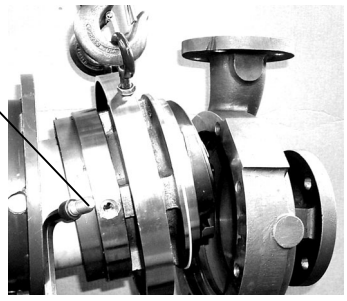
Insure the pump's motor switch is in the "***off***" position and locked out.

DISASSEMBLY



1-Remove bolts 56. Use 3/8 Allen wrench.

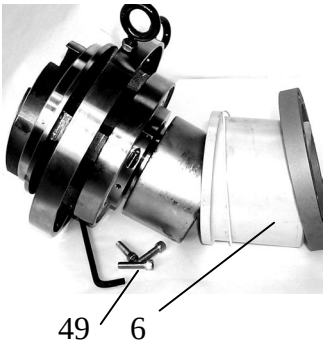
2-Pull back bracket 10 and motor on close coupled models. Remove power frame on long coupled units.



3-Remove bolts 61.

Use ½ Allen wrench.

4-Remove case cover 4 containment shell 6 impeller 2 and module.



5-Remove screws 49 and containment shell 6.Use 5/16 Allen wrench.

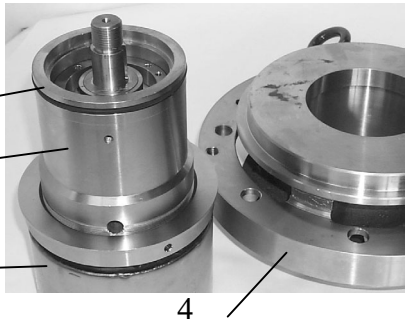
6-Remove impeller nut 3.

Use 1 5/16 socket.

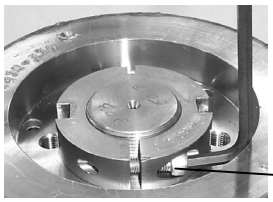
7-Remove impeller 2 and barrier components:

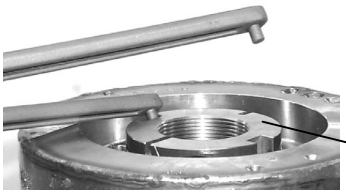
primary ring 38-3
o-ring 38-4
disk 38-5
springs 38-7 (4)
retainer 38-6

8-Remove cover 4 from module.



9-Loosen lockscrew 46 (Use 3/16 Allen wrench). Use pin spanner and remove locknut 25

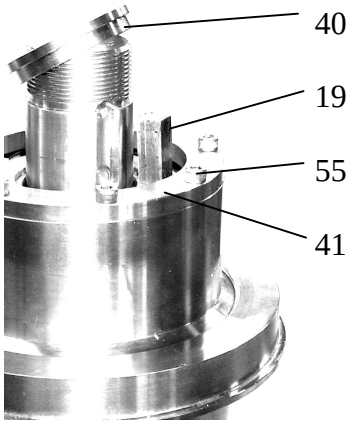




10-Remove inner magnet 16,key 19 and spacer 40

11-Remove screws 55 (use 9/64 Allen wrench)

12-Remove bearing preload cap 41,spring 51



13-Remove shaft

14-Remove angular contact bearings 22

NOTE RE-USE OF O-RINGS AND BEARINGS NOT RECOMMENDED

END DISASSEMBLY

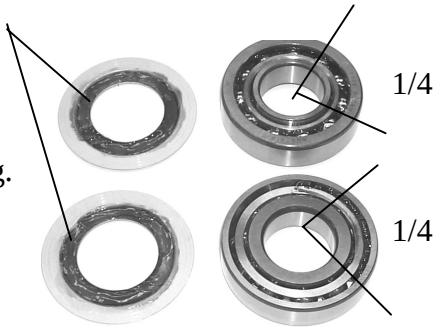
ASSEMBLY

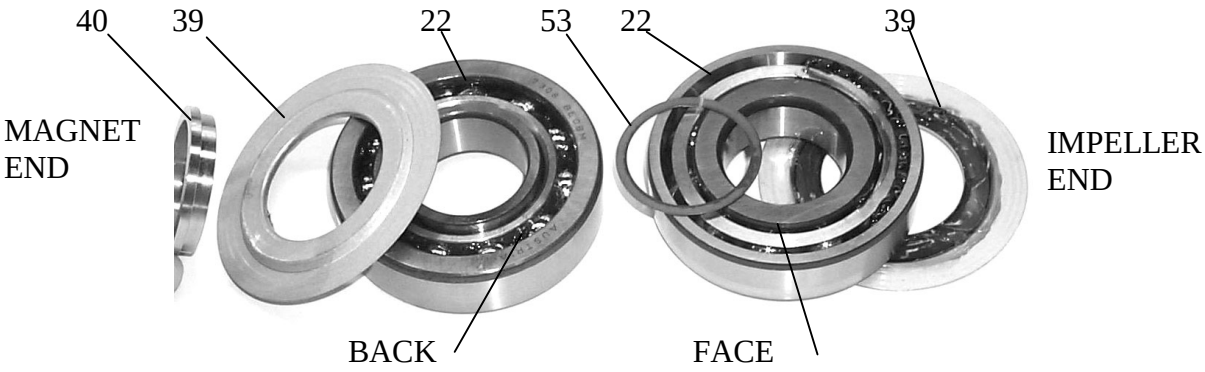
1-Fill pocket in grease retainers 39 with grease.

2-Add grease to bearings 22. Fill ¼ on each side.

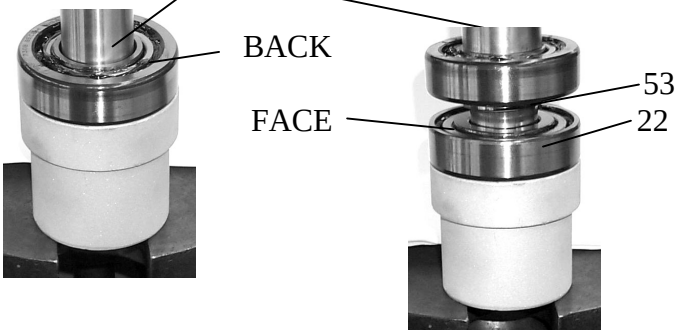
3-Bearings are designed for face to face mounting.

4-Layout components as shown.

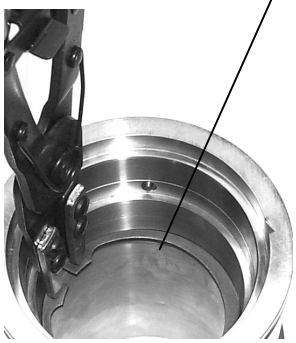




5-Install shaft 17……install spacer 53 bearing 22…… install grease retainer into bearing housing 5

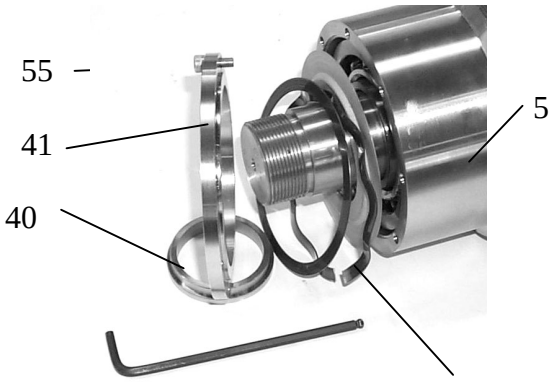


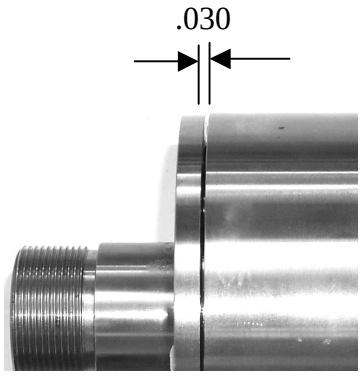
6-Install retaining ring 37……..install shaft 17 bearings 22 spacer 53 into bearing housing 5



7-Install grease retainer 39 spring 51

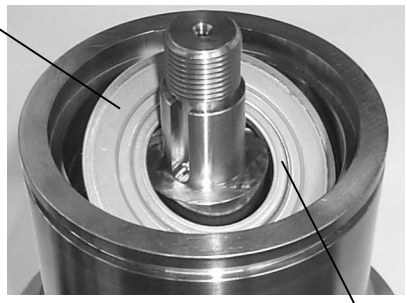
bearing preload cap 41 and screws 55 (fingertight)……..add shim 52 as required to obtain .030 compression





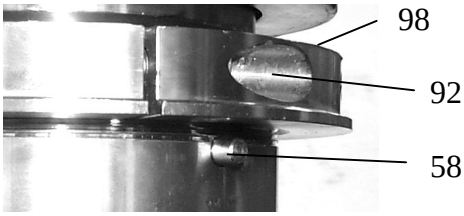
8-Tighten screws 55.

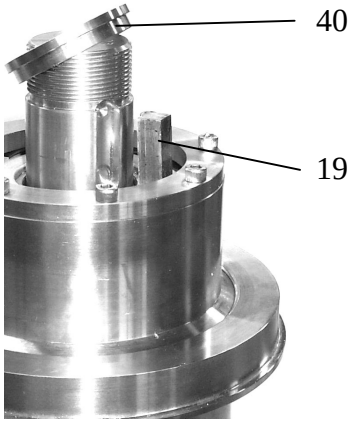
9-Install bearing 23……..install labyrinth ring 36



NOTE NARROW ID RING FACES IMPELLER

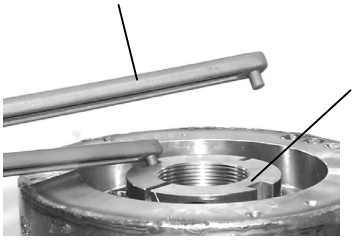
10-Install locknut 98 screw 92 and pin 58 …install key 19 and spacer 40

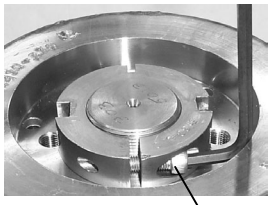




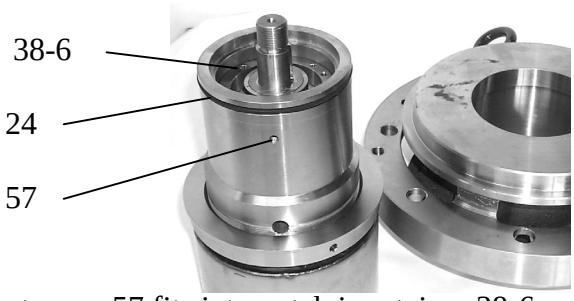
11-Install screw 46 and locknut 25……tighten screw 46 (use 3/16 Allen wrench)

tighten with pin spanner





12-Install o-ring 24 setscrew 57……**13**-Install cover 4 onto module and retainer 38-6 align pin 58 into counterbore



NOTE setscrew 57 fits into notch in retainer 38-6

To prevent its rotation (do not tighten)

ASSEMBLED UNIT

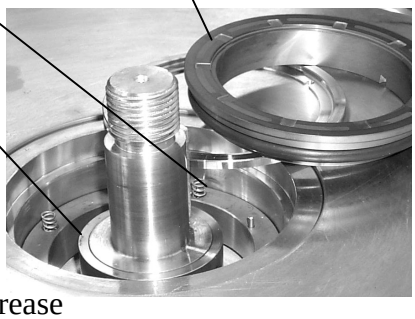
14-Install springs 38-7

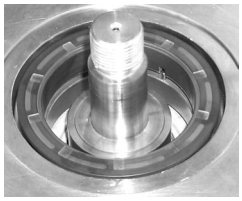
15-Install spacer 35

16-Install disk 38-5

17-Install o-ring 38-4 onto primary ring 38-3

(wipe o-ring sparingly with grease SETINEL DSF3000 recommended)





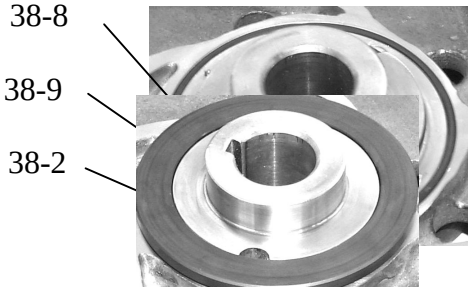
18-Assemble primary ring over pins in retainer 38-6. Primary ring must float up and down freely.

19-Install o-ring 38-8. This o-ring acts as a centering device for the mating ring 38-1.

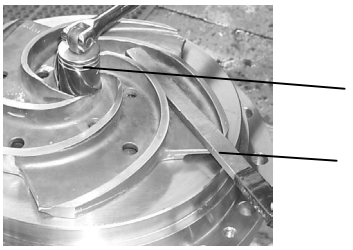
20-Install o-ring 38-9 and two drive pins 38-2

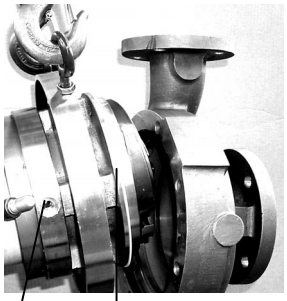
NOTE: .090 PIN EXTENSION

21-Install mating ring 38-1 onto impeller 2



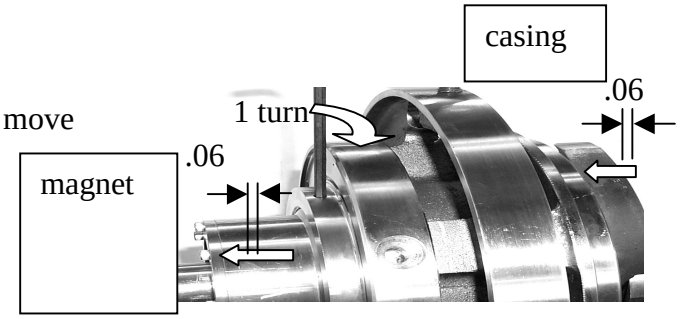
22-Install impeller key 18, impeller 2 and secure with impeller nut 3 and o-ring 65.





23-Install gasket 72 and assembled unit into casing 1. Secure with bolts 61. Use ½ Allen wrench.

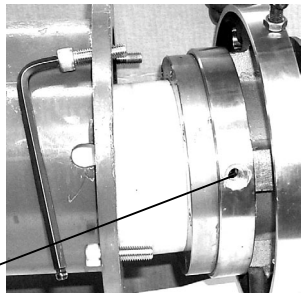
24-Rotate locknut 98 as shown to move module axially relative to casing.



25-Install o-ring 74 into flange 73, and onto containment shell 6.

26-Install o-ring 71 and secure containment shell to cover 4.

27-Secure bracket 10 to cover 4 with bolts 56. Use 3/8 Allen wrench.

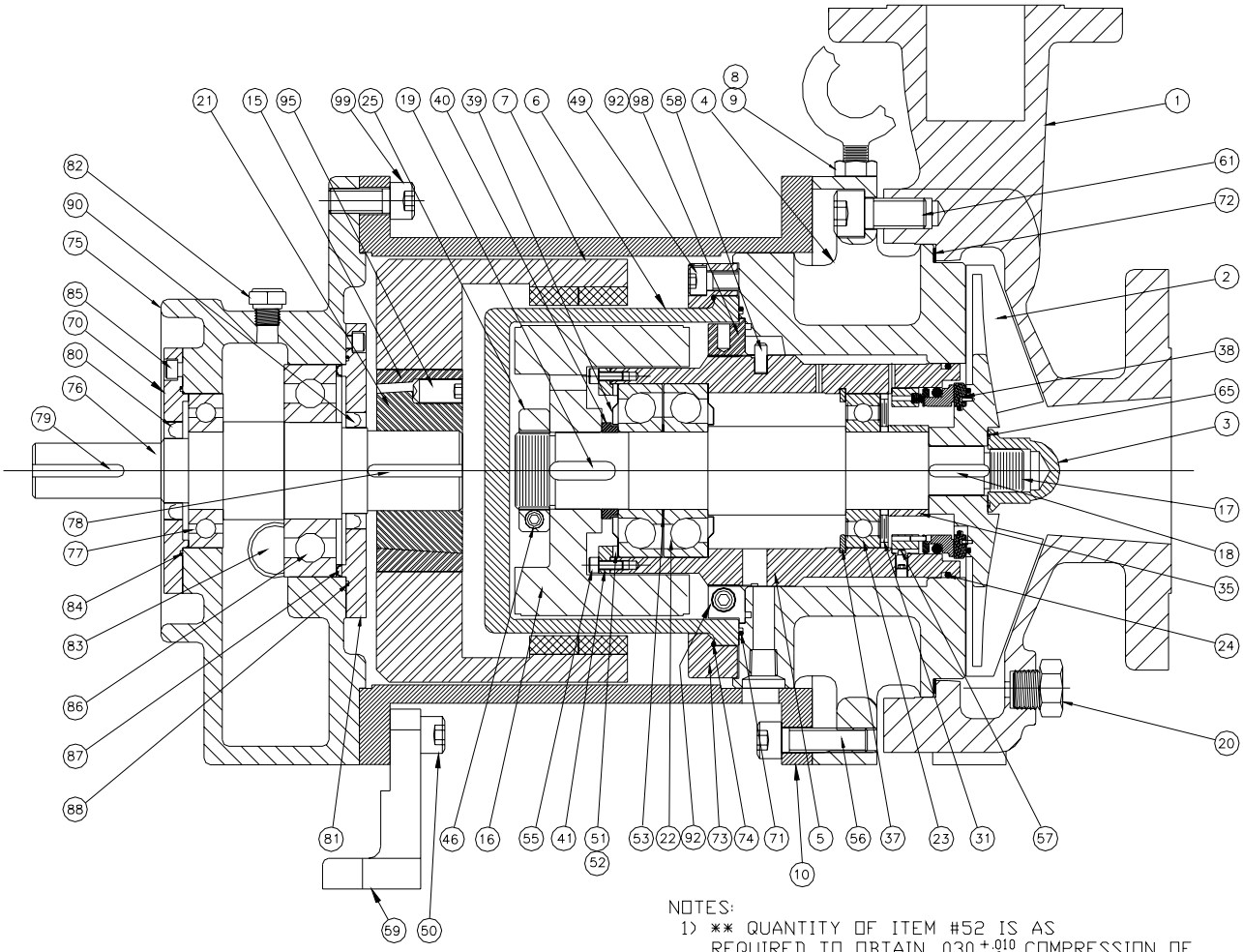


28-ATTACH BARRIER GAS SUPPORT LINES

NOTE; FOR OUTER MAGNET LOCATION REFER TO SECTIONAL ASSEMBLY

END ASSEMBLY

GROUP 2 BARRIER SECTION

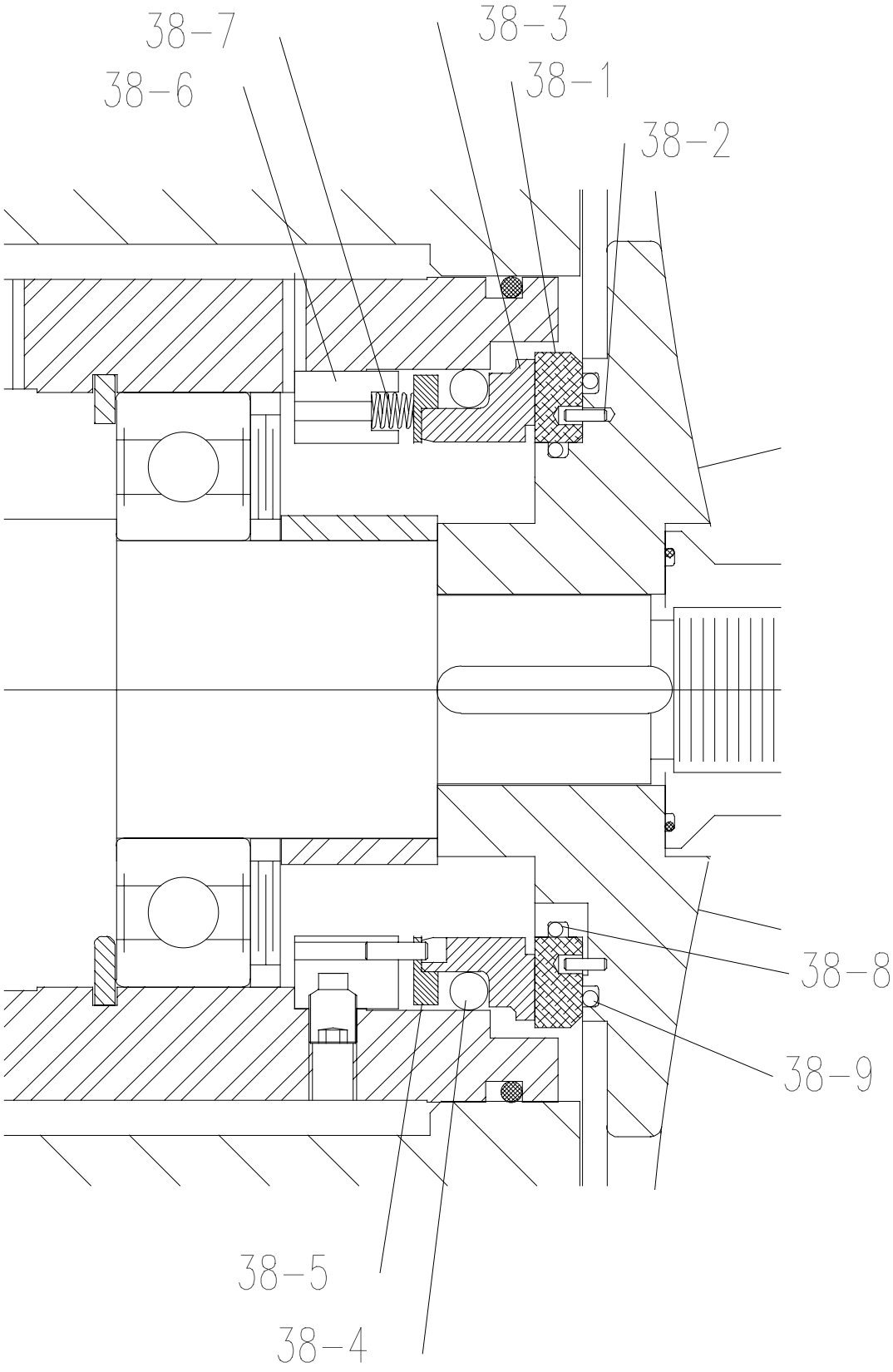


NOTES:
1) ** QUANTITY OF ITEM #52 IS AS REQUIRED TO OBTAIN .030 $^{+.010}_{-.0}$ COMPRESSION OF ITEM #51

PARTS LIST E5474PF		
ITEM	REQD	DESCRIPTION
1	1	CASING
2	1	IMPELLER
3	1	NUT
4	1	COVER, CASING
5	1	BEARING HOUSING
6	1	CONTAINMENT SHELL
7	1	OUT. MAG.
8	2	EYEBOLT
9	2	NUT
10	1	MOUNTING BRACKET
15	1	ADAPTER, TAPER LOCK
16	1	ASS'Y, INNER MAGNET
17	1	SHAFT
18	1	KEY, IMPELLER
19	1	KEY, INNER MAGNET
20	1	PLUG, 1/2 NPT
21	1	BUSHING, TAPER LOCK
22	2	BEARING, THRUST
23	1	BEARING, RADIAL
24	1	O-RING
25	1	LOCKNUT, INNER MAGNET

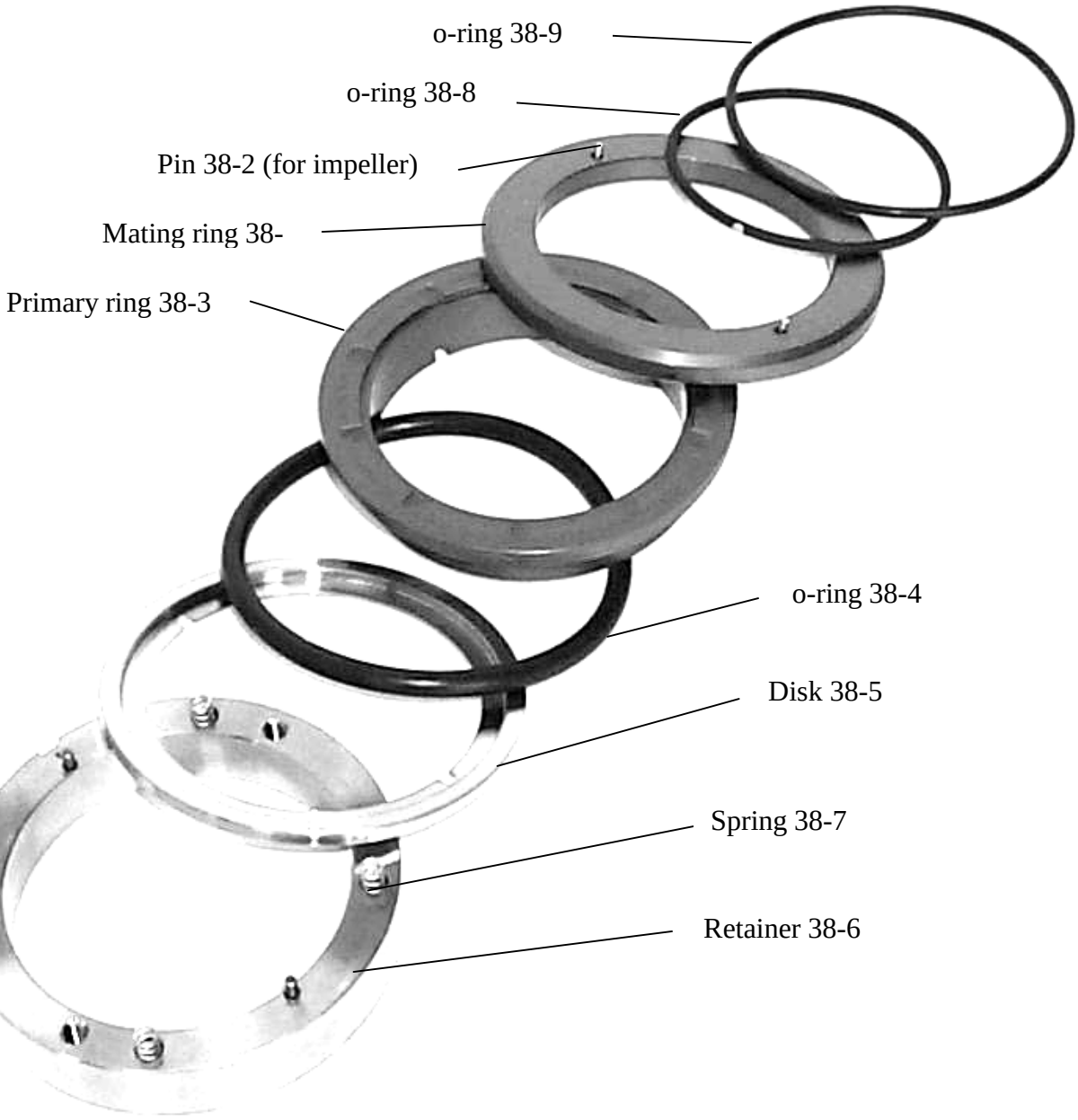
35	1	SPACER
36	1	LABYRINTH RING
37	1	RING, RETAINING
38	1	ASSEMBLY AIR BARRIER
39	2	NILOS RING
40	1	SPACER
41	1	BRG. PRE-LOAD CAP
46	1	1/4-28 X 3/4 SHCS
49	8	3/8-24 X 1 1/2 SHCS
50	2	1/2 - 13 X 1" SHCS
51	1**	WAVE SPRING
52	**	SHIM, THRUST BEARING
53	1	SPACER, THRUST BEARING
55	8	#8-32 X 1/2 SHCS
56	4	1/2-13 X 1-1/2 SHCS
57	1	1/4-28 X 3/8 SHSS
58	1	ANTI-ROTATION PIN
59	1	FOOT
61	8	5/8-11 X 1 1/4 SHCS
65	1	O-RING, IMPELLER NUT
70	1	COVER
71	1	O-RING, C'SHELL
72	1	GASKET

73	1	FLANGE, C'SHELL
74	1	O-RING, FLANGE
75	1	HOUSING, POWER FRAME
76	1	SHAFT
77	1	BEARING
78	1	KEY, HUB
79	1	KEY, COUPLING
80	1	SEAL
81	1	COVER
82	1	BREATHER
83	1	SIGHT GLASS
84	1	O-RING
85	8	1/4-28 X 3/8 SHCS
86	1	BEARING
87	1	SPRING
88	1	O-RING
89	1	O-RING
90	1	SEALS
92	1	5/16-24 X 1 SHCS
95	2	1/2 X 1 SHSS
98	1	LOCKNUT BEARING HSG.
99	4	1/2 - 13 X 1 1/4 SHCS



BARRIER SECTION (ITEM 38)

BARRIER COMPLETE (ITEM 38)



Trouble Shooting Guide

Problem	Possible Cause	Remedy
No Discharge	Pump not primed	Verify suction pipe is submerged Open suction valve
	Wrong direction of rotation	Reverse motor leads
	Valves closed	Verify valves are open
	Bypass valve open	Adjust bypass valve
	Air leak in suction	Tighten connections Apply sealant to all threads Verify suction pipe is submerged
	Clogged strainer	Clean strainer
	Pump worn	Rebuild pump
	Magnetic coupling broken free	Stop pump. Wait till there is no rotation restart pump
Insufficient Discharge	Inlet pressure to low	Npsh problems Verify suction piping is not to long. Fully open suction valves
	Clogged strainer	Clean strainer
	Speed to low	Increase driver speed if possible A larger size pump may be needed.
	Bypass valve open	Adjust bypass valve
	Pump worn	Rebuild pump
Loss of suction after satisfactory operation	Change in fluid properties	Verify fluid properties
	Air leaks in suction line	Tighten connections Verify suction pipe is submerged
Excessive power consumption	Head lower than rating.	Reduce flow.
	Liquid to heavy	Check specific gravity and viscosity
	Worn or damaged parts	Service unit
Rapid pump wear	Abrasives in fluid	Install suction strainer
	Corrosion wear	Materials of construction not acceptable for fluid being pumped
	Misalignment	Align pump and motor

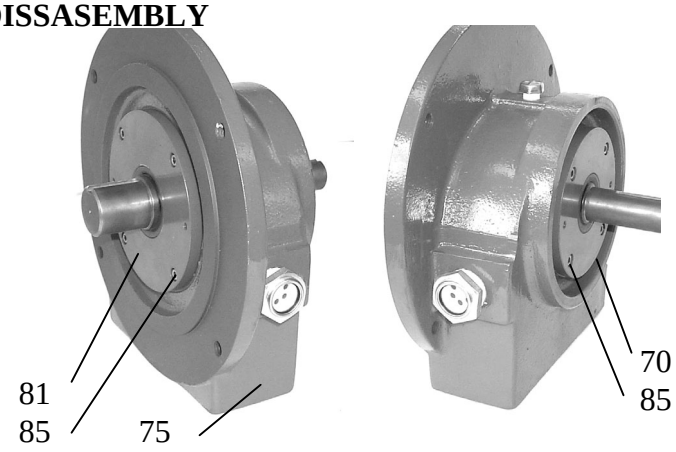
POWER FRAME
ASSEMBLY / DISSASEMBLY

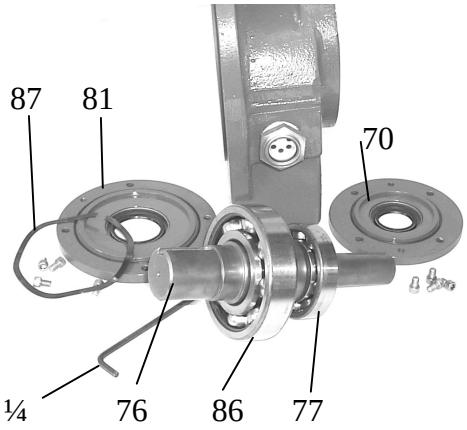
1-Remove screws 85

2-Remove endcaps 70,81

3-Remove rotor and spring 87 from housing 75

Remove rotor towards pump.





1-Press bearings 77,86 onto shaft 76 to shoulder.

2-Press seals 80,90 into endcaps 70,81.

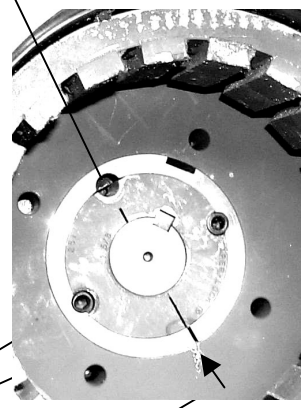
3-Install endcap 80,o-ring 84 and secure with screws 85

4-Install rotor into housing 75.Install spring 87 o-ring 88 endcap 81 and secure with capscrews 81.

5-Install / remove outer magnet. Use ¼ Allen wrench.

Magnet and taper lock must be flush with end of shaft.

6-.DISASSEMBLY Remove screws 95. Reinstall one setscrew 95 into jackscrew location. Loosen bushing by tightening jackscrew.



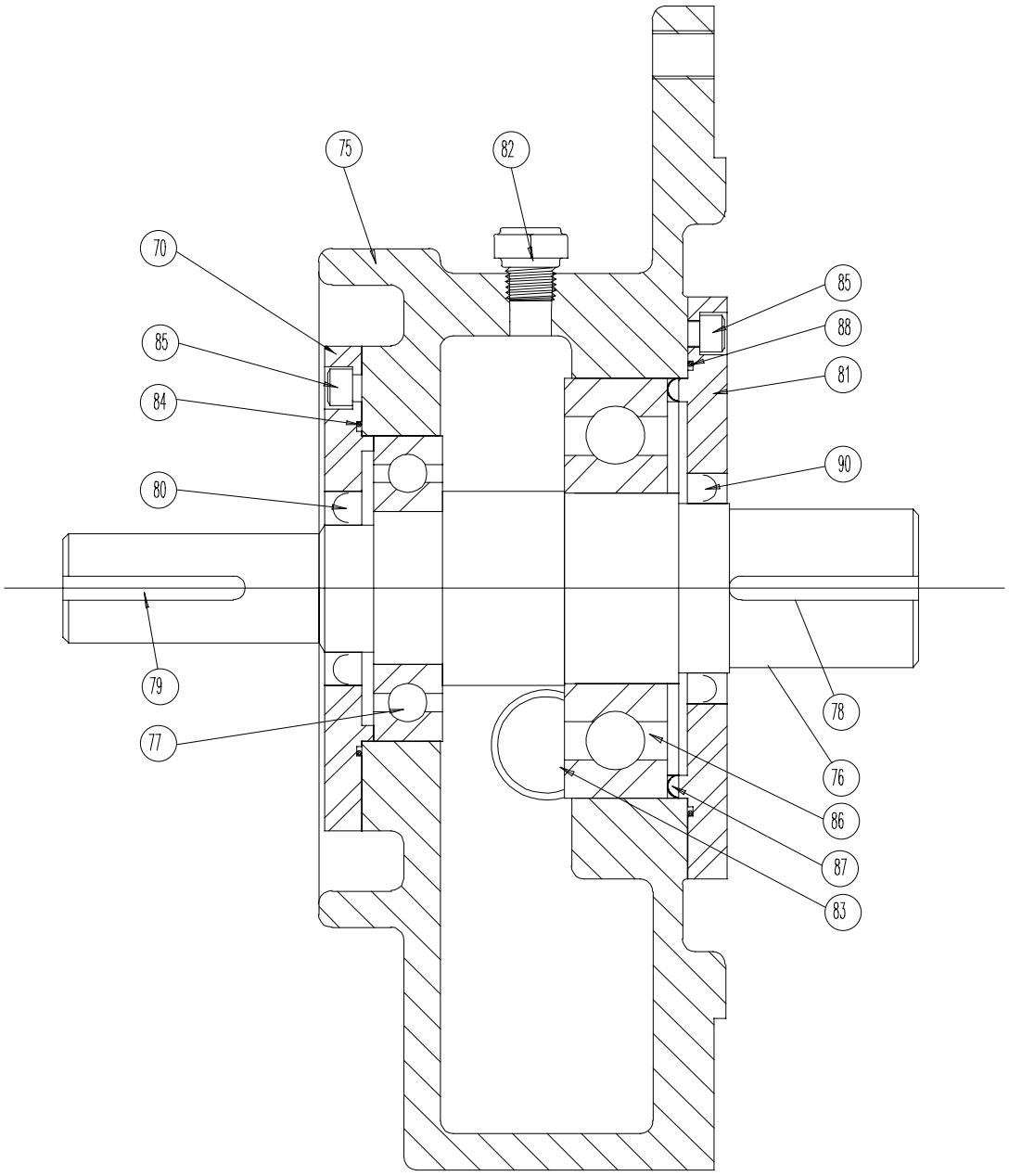
7-ASSEMBLY Do not lubricate the bushing taper, bushing bore, hub taper or the shaft. Doing so could result in breakage of the product.

Lightly oil setscrews and thread into the half threaded holes.

Align split in bushing, adapter and alignment mark as shown by arrow.

Install key. Alternately torque setscrews to 36 ft-lbs (unless otherwise marked)
. DO NOT USE WORN HEX WRENCHES

SECTIONAL POWER FRAME GROUP 2



PARTS LIST			
ITEM	REQ'D	PART NUMBER	DESCRIPTION
70	1	5153-050	ENDCAP, POWER FRAME COUPLING END
75	1	5151-190	CASE, POWER FRAME ASSEMBLY
76	1	5160-050	SHAFT, POWER FRAME
77	1	5156-050	BEARINGS, POWER FRAME, COUPLING END
78	1	5164-050	KEY, POWER FRAME SHAFT, MAGNET END
79	1	5165-050	KEY, POWER FRAME SHAFT, COUPLING END
80	1	2671-250	SEAL, OIL, COUPLING END POWER FRAME
81	1	5154-050	ENDCAP, POWER FRAME MAGNET END
82	1	5274-050	BREATHER, POWER FRAME
83	1	3056-050	SIGHT GLASS
84	1	2665-220	O-RING (2-042), COUPLING END ENDCAP
85	8	2716-060	BOLTS, POWER FRAME ENDCAP
86	1	5157-050	BEARINGS, POWER FRAME, MAGNET END
87	1	5455-050	SPRING
88	1	5155-250	O-RING (2-047), MAGNET END ENDCAP
90	1	5158-250	SEAL, OIL, MAGNET END POWER FRAME

NOTES