



## **OPERATION AND MAINTENANCE MANUAL**

### **MPT SERIES CLOSE-COUPLED REGENERATIVE TURBINE**



### **MAGNETIC DRIVE SEALLESS PUMPS**

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**!WARNING! - MAG DRIVE PUMP**

DO NOT WORK ON THIS PUMP IF YOU ARE WEARING A MEDICAL DEVICE (DEFIBRILLATOR, PACEMAKER, ETC.) PERSONNEL WHO EXPERIENCE INTERFERENCE WITH THEIR MEDICAL DEVICE SHOULD MOVE AWAY FROM THE PUMP AND REFRAIN FROM HANDLING MAGNETIC PUMP COMPONENTS. SEEK IMMEDIATE MEDICAL ATTENTION IF YOU HAVE EXPERIENCED INTERFERENCE WITH YOUR MEDICAL DEVICE.

The rare earth permanent magnets in this pump have been manufactured such that the magnetic field is directional toward each half of the magnetic coupling. For this reason, the magnetic field that exists outside of the assembled magnetic coupling is minimal. When the two halves are apart, the magnetic field is exposed, which is why we recommend that personnel wearing medical devices DO NOT HANDLE the magnetic coupling components. When the pump is assembled, the magnetic fields from the magnetic coupling components are not exposed and it is safe for wearers of medical devices to be in the general proximity of the assembled pump, whether the pump is in operation or not.

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### MPT SERIES

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**WARNING:**  
**WHEN WORKING ON MAGNETICALLY DRIVEN PUMPS**

- ◆ Strong magnetic fields may damage watches, credit cards, computer disks, calculators and computer tapes.
- ◆ People with pacemakers should be cautioned that the strong magnetic field may upset the timing or cause the pacemaker to malfunction.
- ◆ When working on the pumps, be aware that tools or metal parts brought within proximity to the magnets may suddenly be attracted, trapping fingers in the process.

**OPERATING INSTRUCTIONS**  
**MPT SERIES CLOSE-COUPLED PUMPS**

This instruction manual is intended to help those responsible for the installation, operation and maintenance of **MAGNATEX** Magnetic Drive Sealless Pumps. We recommend thoroughly reading this manual and reviewing the Hydraulic Institute Standards regarding Horizontal Centrifugal Pump installation before installing and operating your pump.

**RECEIPT OF EQUIPMENT**

- A. Before uncrating, check for physical damage to the pumping system and notify the common carrier **IMMEDIATELY** if any damage is found.
- B. Check the nameplate on the pump against receiving and purchase order documents to be sure that the correct size pump and materials of construction have been supplied. If a motor has been supplied, check for correct horsepower, speed and voltage.
- C. Check to see if flange protectors are intact. If not, check for foreign objects that may have found their way into the pump casing through the flange openings.
- D. Check for free rotation of the pump. Remove the motor fan cover and rotate the pump using the motor shaft. Only slight resistance should be felt. If the pump has heavy resistance, or if any noise is heard, call your **MAGNATEX** representative or **MAGNATEX PUMPS INC.** at (713) 972-8666.

## FOUNDATION

The foundation should be firm and heavy to reduce vibration. The foundation bolts should be mounted in concrete to provide a firm and positive support.

## LOCATION & PIPING

- A. Locate the pump as close as practical to the source of liquid supply.
- B. The suction line should be as short and straight as possible and contain a minimum number of elbows. Any elbow should be the large radius type. Elbows and fittings should be no closer than 10 pipe diameters to the pump suction to allow undisturbed flow to the pump impeller.
- C. Generally, suction piping should be one or two sizes larger than the pump suction. This will keep friction losses to a minimum. This becomes more important as the distance between the pump and the liquid supply increases, or if fittings are located closer than 10 pipe diameters to the pump's suction.
- D. The suction piping should have no high spots where air pockets can collect. All joints in the suction line should be tight to prevent air from entering into the system and creating the possibility of vapor locking. This is especially important when suction pressure is lower than the atmospheric pressure. A pressure gauge should be installed in the suction line as close as possible to the suction flange.
- E. An air vent should be installed at the initial high point in the pump discharge line. A check valve and shut-off valve should be installed as close as possible to the pump discharge nozzle. The check valve is installed to protect the pump from excessive back pressure, including reverse flow / rotation, and back flow during shut down or driver failure. The discharge valve is at the pump discharge to regulate flow and isolate the pump for servicing. A pressure gauge should also be installed as close as possible to the discharge nozzle between the pump and the discharge valve.
- F. Large particles can block the bearing lubrication ports in the pump causing serious damage. In addition, metallic particles can magnetically attach to the inner magnet also resulting in damage. If possible, a temporary start-up strainer with a 40 X 40 mesh screen should be installed in the pump's suction line. **BE VERY CAREFUL** not to allow the temporary strainer to be plugged to the point of starving the pump of liquid. This may result in cavitation and the possibility of running the pump dry which can destroy the pump's bearings. It is recommended to install a pressure gauge between the strainer and pump to monitor possible plugging of the strainer. The discharge pressure may also be closely monitored. Any drop in the discharge pressure without discharge valve throttling could suggest strainer plugging (assuming constant demand to the system).

- G. **MAGNATEX** pumps, although very rugged, are not designed to handle excessive pipe stress. The resulting forces and moments can result in possible damage to the pump. Piping must be anchored and supported as close as possible to, but independent from the pump. Pump and pipe flanges must be positioned together before attempting to tighten flange bolts.
- H. The pump **MUST NOT RUN DRY**. Adequate liquid should always be available to the pump suction. A flow sensor and/or amp/watt monitor should be installed to shut the pump down in the event of dry run. **MAGNATEX** provides an optional Electronic Pump Protector to prevent dry run.

### **ROTATION CHECK AND START-UP**

To confirm the direction of rotation against the rotation arrow on the pump casing use the following procedure:

- A. Open the suction and discharge valve and allow the pump to be filled with liquid.

### **WARNING! NEVER RUN THE PUMP DRY**

- B. Remove the motor fan cover for visual inspection of rotation.
- C. Bump the motor by quickly pushing the motor start/stop buttons. Rotation should be clockwise as seen from motor end. If the direction of rotation is incorrect, reverse two of the three-phase power leads to the motor.
- D. After confirming proper rotation replace the motor fan cover.

## **PRIMING**

- A. Open the suction and discharge valves and allow the pump to fill with liquid. If the direction of rotation has not been checked, this must be done as detailed under Rotation Check and Start-up before proceeding (see page 3).

## **WARNING! NEVER RUN THE PUMP DRY**

- B. Close the discharge valve to 1/4 open.
- C. Start the motor and immediately check the discharge pressure gauge. The pressure should rise quickly and hold steady. If the pressure rises and then falls back, there is air or vapor in the system. **STOP THE PUMP IMMEDIATELY.** Wait 15 to 20 seconds before restarting the pump.
- D. If after repeating Step C several times, the pressure gauge does not hold steady or does not yield the expected pressure (from performance curve), contact your Magnatex representative, or MAGNATEX PUMPS, INC., for assistance. Do not continue to operate the pump under these conditions.
- E. Once the pump is fully primed and the discharge pressure is satisfactory, slowly open the discharge valve until the desired operating point is reached.

## **OPERATIONS AND MAINTENANCE**

- A. Operators should make frequent visual inspections to insure the pump is running smoothly without noise or vibration. The discharge pressure should hold steady without fluctuation. Any excessive heating of the pump or motor bearings is cause for alarm. The unit should be shut down immediately, an investigation made to find the cause, and corrective action taken.
- B. Follow the motor manufacturer's recommendations and keep the motor bearings lubricated properly.

**WARNING!** Never throttle the pump by closing the valve on the suction side of the pump. Throttling the suction side can cause serious damage to the pump. Throttle only from the discharge valve.

**WARNING!** Never operate the pump against a closed discharge valve. Low flow operation can cause rapid heating of the pumped liquid with possible vaporization and the pump bearings running dry, resulting in serious damage to the pump.

## MAINTENANCE SCHEDULE

<u>Part to be Inspected</u>		<u>Frequency</u>
Inner Magnet Sub-Assembly	Check Thrust Rings, Sleeves and Bushings for wear. Use new gasket upon reassembly.	Every 2-3 years. (depending on service)
Motor	As directed in the motor operations manual.	As directed in the motor operations manual.

## STORAGE PROCEDURES

As shipped, the pumps are suitable for short-term storage only. If long-term storage is necessary before the pump is put into operation, contact your local representative or **MAGNATEX PUMPS** for long-term storage recommendations.

For maximum protection cover the pump with plastic or another protective material. Motors should be greased and rotated by hand every three (3) months.

Before start-up, refer to the section titled Rotation Check and Start-Up (page 3).

## TORQUE CHECK

To determine the static breakaway torque of the magnet coupling, place a torque wrench on the impeller nut and hold the motor fan shaft with channel locks. Slowly turn the torque wrench counterclockwise (as seen from motor end) until the magnets turn over (decouple). The preferred method for checking torque is to insert the torque wrench through the suction nozzle, leaving the casing attached to the pump.

Minimum torque values are as follows:

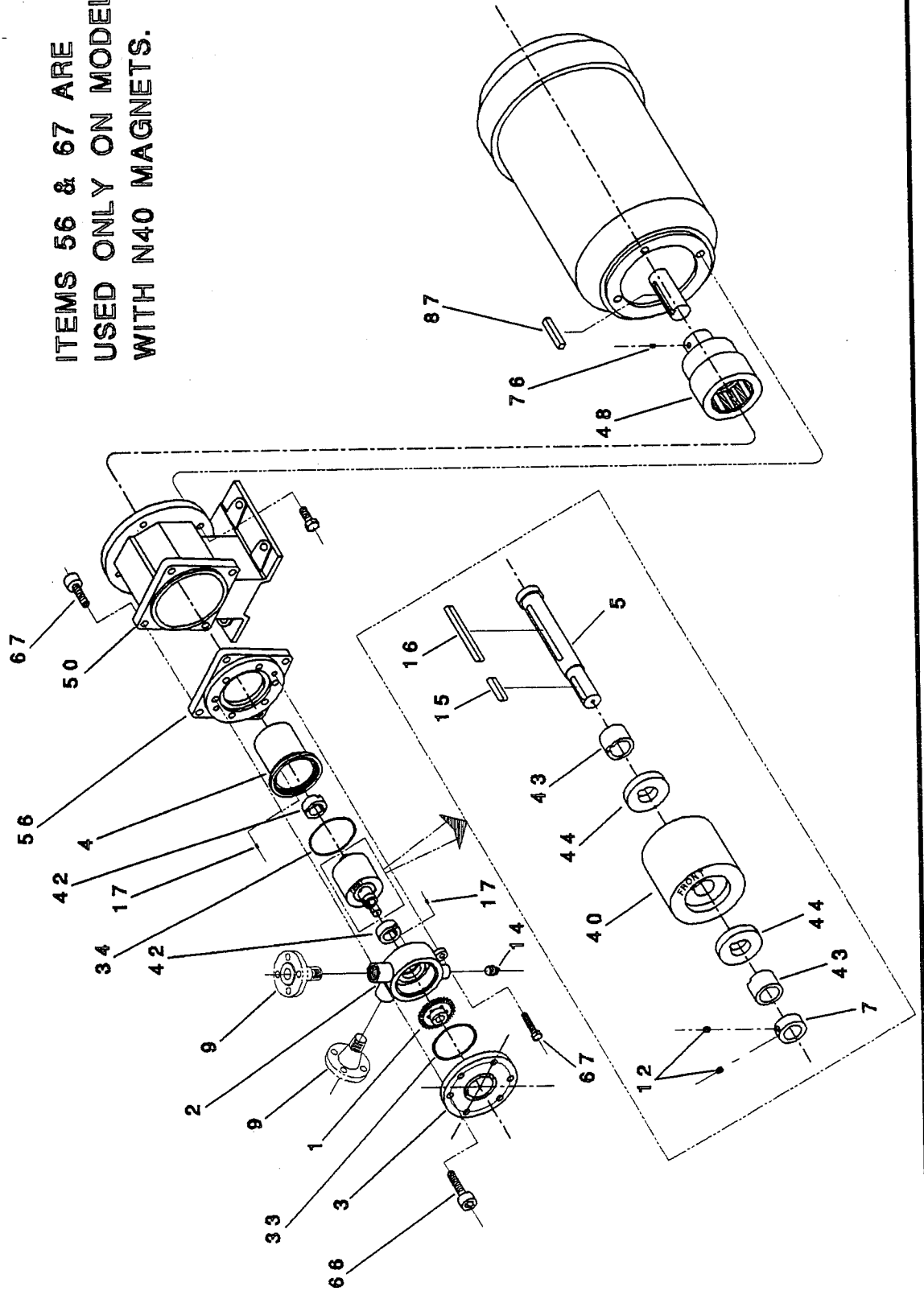
<u>Magnet Size</u>	<u>Minimum Torque (ft-lb)</u>
N25-56C	2.3
N25-140TC	4.6
N40-180TC	11.4

## PARTS LIST - MPT SERIES PUMPS

ITEM NO.	DESCRIPTION	QTY	SIZE	TIGHTENING TORQUE (ft. lbs.)
1	IMPELLER	1		
2	CASING	1		
3	COVER	1		
4	REAR CASING	1		
5	INNER MAGNET SHAFT W/ KEYS	1		
7	COLLAR	1		
9	(OPTIONAL) THREADED FLANGES	2		
12	SET SCREW	2	M5	1.7
14	DRAIN PLUG	1	½" NPT	
15	IMPELLER KEY	1		
16	INNER MAGNET KEY	1		
17	BUSHING PIN	2		
33	O-RING	1		
34	O-RING	1		
40	INNER MAGNET	1		
42	BUSHING	2		
43	SLEEVE	2		
44	THRUST RING	2		
48	OUTER MAGNET	1		
50	FRAME ADAPTER	1		
56	ADAPTER FLANGE	1		
66	HEX SOCKET HEAD CAPSCREW	6	M8	8.8
67	HEX SOCKET HEAD CAPSCREW	4	M10	17.7
76	OUTER MAGNET SET SCREW	1	M8	4.4
87	MOTOR KEY	1		

# MAGNATEX MPT SERIES PUMPS

ITEMS 56 & 67 ARE  
USED ONLY ON MODELS  
WITH N40 MAGNETS.





## **DISASSEMBLY OF WETTED END - MPT SERIES**

1. Disconnect wiring from the motor terminal box.
2. Close the suction and discharge valves. Remove the casing drain plug (Item 14) and empty the pump of any remaining liquid.
3. Remove the four bolts attaching the frame adapter (Item 50) to its base. Remove the pump and motor from the base and piping.
4. Remove the six (6) hex socket head capscrew (Item 66).
5. Lift the cover (Item 3) from the casing (Item 2). (Due to the o-ring seal between the cover (Item 3) and the casing (Item 2), gentle prying may be required to break the seal.)
6. Remove the o-ring (Item 34) from the cover (Item 3) / casing (Item 2).
7. Slide the impeller (Item 1) off of the inner magnet shaft (Item 5) and out of the casing (Item 2).
8. Remove the two hex head capscrews (Item 69) from the casing (Item 2).
9. Carefully lift off the casing (Item 2). (Due to the o-ring seal between the casing (Item 2) and the rear casing (Item 4), gentle prying may be required to break the seal.)

**Caution:** The front bushing (Item 42) is loose in the casing. Be prepared to hold bushing as the casing clears the inner magnet shaft (Item 5).

**Note:** The bushings (Item 42), sleeves (Item 43), and thrust rings (Item 44) are interchangeable front to rear. "Front" and "rear" are used to denote their placement in relation to the inner magnet (Item 40). "Front" refers to the bushing (Item 42), sleeve (Item 43) or thrust ring (Item 44) located between the impeller (Item 1) and the inner magnet (Item 40). "Rear" refers to the bushing (Item 42), sleeve (Item 43) or thrust ring (Item 44) located next to the inner magnet (Item 40) farthest from the impeller (Item 1).

10. Remove the bushing (Item 42) from bearing holder in the casing (Item 2). Check if the bushing pin (Item 17) is securely in place in bearing holder.
11. Remove the o-ring (Item 33) from the casing (Item 2) / rear casing (Item 4).
12. Hold onto the inner magnet shaft (Item 5) and pull the shaft assembly from the rear casing (Item 4).

**Caution:** The bushing (Item 42) in the bottom of rear casing may come out with inner magnet shaft. Be prepared to hold the bushing as the shaft clears the rear casing.

13. Remove the bushing (Item 42) from bearing holder at the bottom of the rear casing (Item 4). Check if bushing pin (Item 17) is securely in place in the rear casing.
14. Remove the impeller key (Item 15). Loosen the two set screws (Item 12) in the collar (Item 7). Slide the collar from the inner magnet shaft (Item 5).
15. Slide the front sleeve (Item 43), front thrust ring (Item 44), inner magnet (Item 40) and rear thrust ring (Item 44) off of the inner magnet shaft (Item 5).
16. Remove the inner magnet key (Item 16) from the inner magnet shaft (Item 5). This allows the rear sleeve (Item 43) to slide off of the inner magnet shaft.

#### **DISASSEMBLY OF DRY END - MPT SERIES**

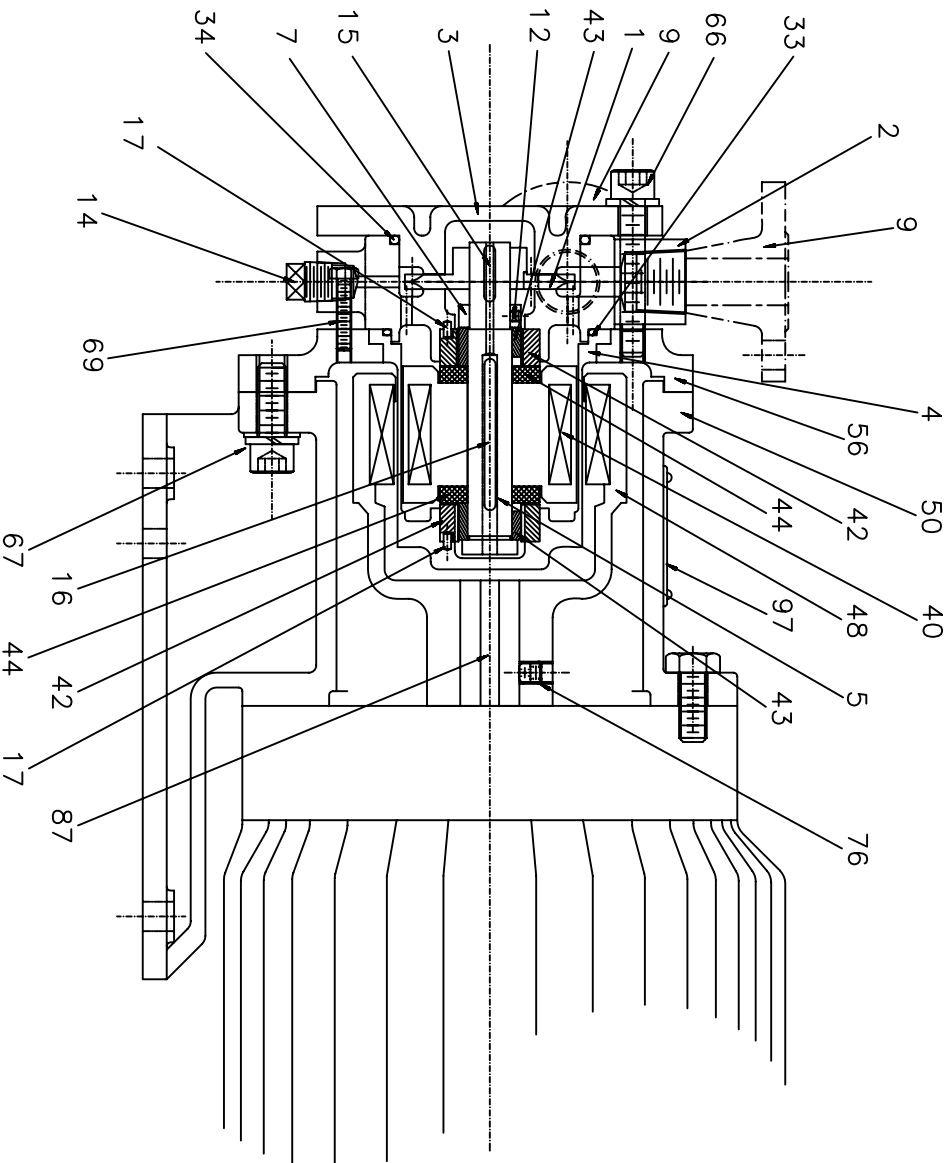
1. Remove the four hex head bolts that hold the motor to the frame adapter (Item 50).
2. Remove the motor from the frame adapter (Item 50).
3. Loosen the outer magnet set screw (Item 76) and pull the outer magnet (Item 48) off the motor shaft.

RECOMMENDED TIGHTENING TORQUE

BOLT SIZE (mm) \_\_\_\_\_ FORCE (ft. l.b.) \_\_\_\_\_

8 8.8  $\Delta$   
 10 17.7

97	NAMEPLATE	1	1	
87	MOTOR KEY	1	1	
76	OUTER MAGNET SET SCREW	1	1	M8x8L
69	HEX HEAD CAPSCREW	2	2	M6
67	HEX SOCKET HEAD CAPSCREW	4	4	M10
66	HEX SOCKET HEAD CAPSCREW	6	6	M8
56	ADAPTER FLANGE	1	1	
50	FRAME ADAPTER	1	1	
48	OUTER MAGNET	1	1	
44	THRUST RING	2	2	
43	SLEEVE	2	2	
42	BUSHING	2	2	
40	INNER MAGNET	1	1	
34	O-RING	1	1	
33	O-RING	1	1	G85
17	BUSHING PIN	2	2	$\phi$ 3x6L
16	INNER MAGNET KEY	1	1	6x6x61
15	IMPELLER KEY	1	1	5x5x20
14	CASING DRAIN PLUG	1	1	3/8" NPT
12	SET SCREW	2	2	M5x5L
9	(OPTIONAL) THREADED FLANGE	2	2	
7	COLLAR	1	1	
5	INNER MAGNET SHAFT WITH KEYS	1	1	
4	REAR CASING	1	1	
3	COVER	1	1	
2	CASING	1	1	
1	IMPELLER	1	1	
ITEM	DESCRIPTION	QTY	SPARE	REMARK
		NO.	REC'D	



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SECTIONAL DRAWING  
 MPT SERIES CLOSE-COUPLED PUMPS

182TC & 184TC  
 FRAME MOTORS  
 SD-4300

## **ASSEMBLY OF WETTED END - MPT SERIES**

1. Slide the rear sleeve (Item 43) on to the inner magnet shaft (Item 5), so that the notch in the sleeve will fully expose the keyway in the shaft.

**Note:** The bushings (Item 42), sleeves (Item 43), and thrust rings (Item 44) are interchangeable front to rear. "Front" and "rear" are used to denote their placement in relation to the inner magnet (Item 40). "Front" refers to the bushing (Item 42), sleeve (Item 43) or thrust ring (Item 44) located between the impeller (Item 1) and the inner magnet (Item 40). "Rear" refers to the bushing (Item 42), sleeve (Item 43) or thrust ring (Item 44) located next to the inner magnet (Item 40) farthest from the impeller (Item 1).

2. Slip the inner magnet key (Item 16) into the inner magnet shaft (Item 5) keyway.
3. Slide the rear thrust ring (Item 44) on to the inner magnet shaft (Item 5) and over the inner magnet key (Item 16).
4. Slide the inner magnet (Item 40) onto the inner magnet shaft (Item 5) and over the inner magnet key (Item 16).

**Note:** The end stamped "Front" on inner magnet must be toward the keyed end (impeller end) of the shaft .

5. Slide a thrust ring (Item 44) onto the inner magnet shaft (Item 5), over the inner magnet key (Item 16) and up against the inner magnet (Item 40)..
6. Slide a sleeve (Item 43) onto the inner magnet shaft (Item 5) and engage the notch on the sleeve with the inner magnet key (Item 16).
7. Slide the collar (Item 7) on to the inner magnet shaft (Item 5) and up against the sleeve (Item 43). *Without mechanical assistance*, press firmly down on the collar compressing the stack of sleeves (Item 43), thrust rings (Item 44), and the inner magnet (Item 40) together and set the two (2) set screws (Item 12).
8. Place the impeller key (Item 15) into the inner magnet shaft (Item 5).
9. Check bushing pin (Item 17) in the bearing holder in the rear casing (Item 4) and replace as needed. Slide a bushing (Item 42) into the bushing holder so that the notch in the bushing engages the bushing pin.

10. Place the frame adapter (Item 50) on the workbench so that the motor end is down and the pump end is up. [*For 182TC / 184TC Frames Only:* Place the adapter flange (Item 56) onto the frame adapter and bolt in place with the four hex socket head capscrews (Item 67).]
  11. Place the rear casing (Item 4) into its registered fit in the frame adapter (Item 50) [for 56C and 143TC / 145TC frames] or the adapter flange (Item 56) [for 182TC / 184TC frames].
  12. Slide the inner magnet (Item 40) / inner magnet shaft (Item 5) assembly into the rear casing.
  13. Place O-ring (Item 33) into its groove in the rear casing (Item 4).
  14. Check bushing pin (Item 17) in the bearing holder in the casing (Item 2) and replace as needed. Slide a bushing (Item 42) into the bushing holder so that the notch in the bushing engages the bushing pin.
  15. Hold the bushing (Item 42) in place in the casing (Item 2) and slide on to the inner magnet shaft (Item 5).
- Note:** The bushing (Item 42) is loose in the casing (Item 2) and may fall out or slip out of position if not held in place.
16. Compress the o-ring (Item 33) by tightening the hex head capscrews (Item 69).
  17. Slide the impeller (Item 1) onto the inner magnet shaft (Item 5) and over the impeller key (Item 15), so that the hub on the impeller is facing away from the inner magnet (Item 40).
  18. Place O-ring (Item 34) into its groove in the casing (Item 2).
  19. Turn impeller (Item 1) by hand to check for free rotation. If resistance or scraping is felt, or if noises are heard (scraping, etc.), inspect the pump to find the cause and take corrective action.
  20. Slide the cover (Item 3) into place in the casing (Item 2). Complete the assembly with the hex socket head capscrews (Item 66). Tighten in an alternating pattern to prevent binding.
  21. Install the casing drain plug (Item 14) into the casing (Item 2).

## **ASSEMBLY OF DRY END - MPT SERIES**

1. Insert the motor key (Item 87) on motor shaft.
2. Slide the outer magnet (Item 48) onto motor shaft and over motor key (Item 87) until outer magnet hub is flush with the end of the motor shaft. Tighten the outer magnet set screw (Item 76).
3. Attach motor to the frame adapter (Item 50). Bolt the motor to the frame adapter (Item 50).
4. Torque check pump magnets. If magnets de-couple below minimum torque value, magnets should be replaced. Refer to the section Torque Check (page 5).
5. Always check for free rotation before operating the pump.

## **NOTES - MPT SERIES**