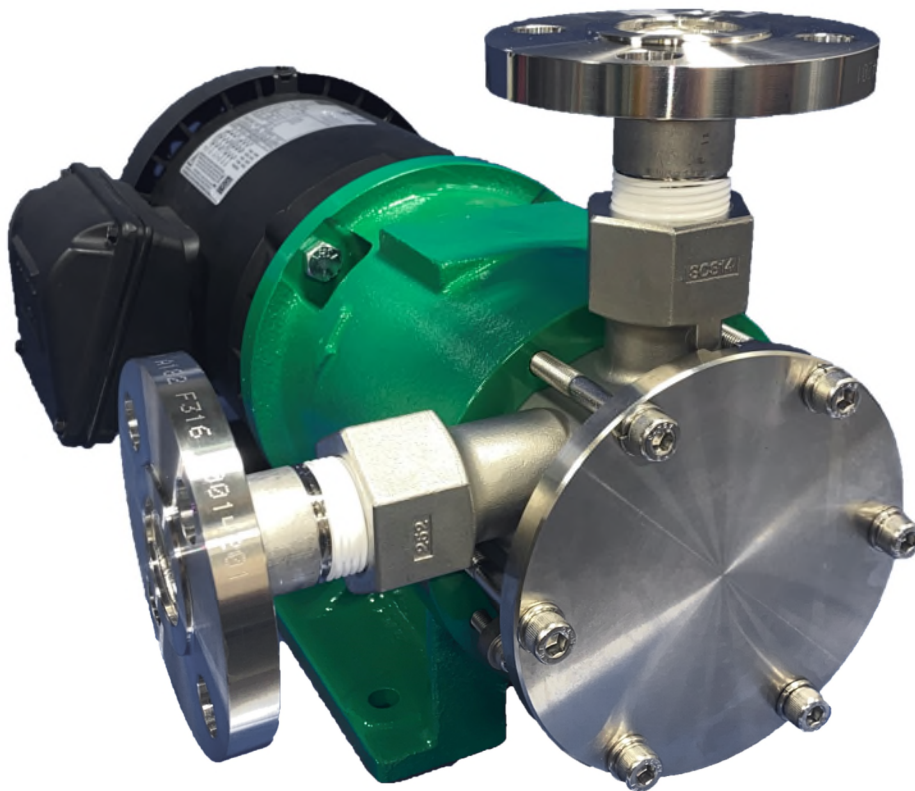




Operation and Maintenance Manual

Magnetic Drive Sealless Pumps

MPT/MPTH SERIES



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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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WARNING: WHEN WORKING ON MAGNETICALLY DRIVEN PUMPS

- These pumps contain strong industrial rare earth magnets.
- People wearing pacemakers or other metallic medical devices are strongly cautioned that the magnetic field of exposed magnetic components may upset the timing or cause medical device malfunction. Remove the source of or exit the magnetic field if ill effects are experienced.
- Strong magnetic fields of exposed magnetic components may damage watches, credit/bank cards, electronic media storage devices, computers, or other such electronic devices.
- When working on the pumps with exposed magnetic components, be aware that metal objects such as wrenches or other tools brought with proximity of the magnetic field of the magnets may suddenly be attracted to the magnets trapping and damaging fingers in the process

GENERAL INSTRUCTIONS

This instruction manual is intended to assist those responsible for the installation, operation, and maintenance of MAGNATEX Magnetic Drive Sealless Pumps. Read the complete manual thoroughly, and review the Hydraulic Institute Standards [Rotodynamic Pumps for Pump Piping \(ANSI/HI 9.6.6-2016\)](#) before installing and operating the pump.

RECEIPT OF EQUIPMENT

- A. Upon receipt and before uncrating, check for physical damage to the pump/motor unit and notify the freight carrier IMMEDIATELY if any damage is found. Note any damage on the freight bill receiver and take photos of all packaging and damaged areas.
- B. Check the pump nameplate data against receiving and purchase documents to be sure the correct pump size and materials of construction have been supplied. If a motor has been supplied, check the motor nameplate for correct HP rating, speed, enclosure, and electrical ratings.
- C. Check to see if flange/nozzle connection protectors are intact. If missing or compromised, check for objects or debris that may have settled into the pump casing through the nozzle openings.
- D. Check for free rotation of the pump by hand. With the motor installed on the pump, remove the motor fan cover and rotate the pump by hand using the motor shaft at the fan end of the motor. Only slight resistance and smooth rotation should be felt. There should be no crunching, grinding, or hard spots in the rotation. If the pump is completely dry, the Silicon Carbide (SiC) bearing components may emit a slight squeal/chatter, which is dependent upon the speed of rotation. Rapid rotation by hand is not recommended. The high-pitched squeal/chatter is normal and does not indicate damage. Contact your

MAGNATEX representative/distributor or MAGNATEX PUMPS INC. (713-972-8666) with any questions.

STORAGE PROCEDURES

As shipped, the pump packaging is suitable for short-term storage only, ~3-6 months, and the unit(s) should be stored indoors in a protected and controlled environment away from weather extremes. If long term storage is necessary prior to pump installation/operation, contact your local representative or MAGNATEX PUMPS INC. for long-term storage recommendations.

For maximum protection cover the pump with plastic or other protective material. Motors should be rotated by hand every 2-3 months. Maintain pump nozzle covers in place until ready for installation. Before start-up, refer to the section titled Rotation Check and Start-up.

PUMP AND MOTOR ALIGNMENT

MPT pumps are close-coupled pumps with the motor fitted to the pump frame adapter with a machined register fit, which eliminates the need for external pump and motor alignment. A small gap between the motor mounting flange and the pump frame adapter is normal and should be equal.

FOUNDATION

The foundation should be firm and heavy to reduce vibration and prevent flexing which can result in misalignment. A concrete foundation with a solid baseplate is recommended. Foundation bolts of the correct size should be located by reference to certified drawings. A baseplate is not necessary, but is available as an option in steel, stainless steel and non-metallic quartz-polymer materials. Anchor bolts for non-metallic baseplates should be torqued to only 15-20 ft-lbs.

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 elbows 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. The higher the velocity the greater the distance of straight pipe is needed.
- C. Generally, suction piping should be one or two sizes larger than the pump suction to keep friction losses to a minimum. This becomes more important as the distance between the pump and the liquid supply increases, or similarly, if the piping fittings/connections are located closer than 10 pipe diameters to the pump's suction; see B above.
- 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 compound pressure gauge should be installed in the suction line at two pipe diameters from 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 located at the pump discharge to regulate flow and isolate the pump for servicing. A pressure gauge should also be installed on the discharge side of the pump at two pipe diameters downstream of the pump discharge flange.

- F. Prior to starting the pump, it is important to flush the piping to ensure the system is free of foreign matter and particles such as pipe scale, welding beads and dirt from system fabrication. 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 startup strainer with a 40x40 US 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, resulting in cavitation and the possibility of running the pump dry. Since running the pump dry can destroy the pump's bearings, it is recommended to install a compound pressure gauge between the strainer and pump suction to monitor partial plugging of the strainer. The discharge pressure should also be closely monitored. Any drop in discharge pressure without discharge valve throttling could indicate partial 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 on the pump can result in misalignment and possible damage to the pump. Piping must be anchored as close to, but independent from, the pump. Pump and pipe flanges must be positioned together with gaskets (supplied by others) before attempting to tighten flange bolts.
- H. The pump MUST NOT RUN DRY. To assure that adequate liquid is available to the pump suction, a flow sensor and /or power monitor should be installed to shut the pump down in the event of dry run. MAGNATEX provides an optional electronic power monitor offered at time of pump quotation to prevent dry run operation when properly installed and set according to the normal operating parameters of the pump.

ROTATION CHECK, AND START-UP

Removal of air from the pump system is critical for proper system and component performance. Trapped air/vapor voids in the system piping can cause reduced discharge pressure readings and "choked" system flow. Safely vent all air/vapor from the system following best operational procedures.

Before the pump is placed in service check the direction of motor shaft rotation as noted below. Rotation should match the cast-in arrow or label and the direction of the casing scroll terminating under the discharge flange.

ROTATION

- A. Open the suction and discharge valves and allow the pump to be filled with liquid. Vent piping at system vent points.

!WARNING! NEVER RUN THE PUMP DRY

- B. Remove the motor fan guard for visual inspection of motor shaft 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 at the motor conduit box.
- D. After confirming proper rotation open the motor electrical disconnect and install the motor fan guard.

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 above under Rotation Check and Start-up before proceeding.

!WARNING! NEVER RUN THE PUMP DRY

- B. Close the discharge valve to 1/4 open. Do not operate the pump when the discharge valve is closed.
- 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.** (713-972-8666) for assistance. Do not continue to operate the pump under these conditions.
- E. Once the pump is fully primed and the discharge pressure is steady, slowly open the discharge valve until the desired operating point is reached as referenced by discharge pressure reading and /or flow meter indication. The flow and head should match the design performance curve for the pump as ordered.

LUBRICATION OF PUMP PROCESS BEARINGS

MPT pumps have Silicon Carbide (SiC) hydrodynamic bearings on the process side of the pump that are internally lubricated by the pumped liquid. The pump must have liquid in it during operation to avoid damage and breakage of these product lubricated bearings. An optional material of SiC-X is available for enhanced resistance to lubrication and system upset conditions. Contact your Magnatex representative or MAGNATEX PUMPS INC. (713-972-8666) for more information.

GENERAL NOTES

- A. Standard connection configuration for the pump connections consists of female NPT taps with NPT casing drain tap. Flanged connections are priced options with available seal welding of the threaded connections. Socket-welded, flanged connections are available as production options with factory lead time.
- B. All inner magnets are marked "FRONT" to assist in correct position for reassembly. This marked end of the magnet must face the impeller of the pump.

C. The pump process discharge connection must be positioned in the upward direction for proper venting of the pump casing and rear casing. On the MPT254 model both suction and discharge connections face upward.

D. When accomplishing maintenance tasks and during reassembly, all threaded fasteners must be torqued in accordance with the torque table below.

**RECOMMENDED TORQUE VALUES FOR BOLTS AND SCREWS
MPT151 - 252 SERIES PUMPS**

MPT/MPH MODEL (ALL MAGNET SIZES)	69 Hex Socket Head Bolt (in. lbs.)	66 Casing Socket-Hex Head Bolt (in. lbs.)	12 Socket Hex Head Set Screw (in. lbs.)	76 Outer Magnet Set Screw (in. lbs.)	
151					
201	43	108	15	55	
251	[4.8 Nm]	[12.2 Nm]	[1.5 Nm]	[6.0 Nm]	
252					

**RECOMMENDED TORQUE VALUES FOR BOLTS, NUTS, AND SCREWS
MPT254 PUMPS**

MPT/MPH MODEL 254 MODEL (ALL MAGNET SIZES)	63 Hex Nut (ft. lbs.)	62, 66 Casing Socket- Hex Head Bolt (ft. lbs.)	7 Impeller Nut (ft. lbs.)	7A Socket Hex Head Set Screw (in. lbs.)	6 Sleeve Bolt (ft. lbs.)	6A Socket Hex Head Set Screw (in. lbs.)	76 Outer Magnet Set Screw (in. lbs.)
254	31 [42 Nm]	18 [24 Nm]	34 [45 Nm]	22 [2.4 Nm]	22 [29 Nm]	15 [1.5 Nm]	53 [6.0 Nm]

DISASSEMBLY OF PUMP WET END – MPT151/201/251/252

This procedure assumes the pump has been removed from the system and generally drained of any and all hazardous materials. Always wear personal protective equipment (PPE) when working with hazardous chemicals.

1. Remove the casing drain plug (Item 14) and empty the pump of any remaining liquid. Thoroughly flush the pump; beware of small amounts of liquid that will remain in the pump, particularly in the rear casing.
2. SEPARATING THE MAGNET COUPLING – Strong magnetic forces work to keep the inner magnet (Item 40) and outer magnet (Item 48) coupled. Removal of the motor (with the outer magnet still installed on the motor shaft) from the frame adapter (Item 50) is the easiest way to “break” (disengage) the magnetic couple.



**BE CAREFUL TO AVOID TRAPPING YOUR FINGERS
BETWEEN THE PUMP END ASSEMBLY AND THE
MOTOR FLANGE.**

- a. Firmly secure the pump and motor unit to the worktable top by bolting or clamping.
- b. Support the motor to prevent it from falling from the frame adapter when the mounting bolts are removed. For heavy motors a lifting device (crane, chain-fall, etc.) is recommended to suspend the motor weight. Remove the hex head bolts connecting the motor to the frame adapter. The machined fit between the motor and the frame adapter is tight and the motor may remain in place once the mounting bolts have been removed. A rubber mallet and pry bar may be necessary to separate the motor from the frame adapter. Use these carefully.
- c. With the motor still supported, and yet loose from the frame adapter, prepare to grasp the motor firmly to remove it from the frame adapter in one straight axial motion away from the frame adapter. The magnet forces will attempt to remain engaged, so it is important to have a firm grasp of the motor and continue the outward axial motion when pulling it from the adapter.

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.

- d. Pull the motor from the frame adapter in one straight axial motion, separating the magnet coupling. Keep metal objects away from the interior of the outer magnet to prevent sudden attraction to the magnets, possibly trapping fingers between the metal object, such as a wrench, and the magnet segments.
3. With the motor removed, place the frame adapter on the edge of a worktable, motor side down and casing up, to ease dismantling of the pump.
4. Remove the socket head cap screws (Item 66) and set the casing cover (Item 3) aside.
5. Lift the cover (Item 3) from the casing (Item 2). Due to the O-ring seal between the cover and casing, gentle prying may be required to separate the pieces.
6. Remove the O-ring (Item 34) from the cover, or casing. Replace at reassembly.
7. Slide the impeller (Item 1) off the inner magnet shaft (Item 5) and out of the casing.
8. Remove the two hex cap screws (Item 69) securing the casing to the adapter.
9. Carefully lift off the casing. Due to the O-ring seal between the casing and rear casing (Item 4), gentle prying may be required to separate the pieces.

! CAUTION !

THE FRONT BUSHING IS LOOSE IN THE CASING. BE PREPARED TO HOLD/CATCH THE BUSHING AS THE CASING CLEARS THE INNER MAGNET SHAFT.

NOTE: The bushings (Item 42), sleeves (Item 43), and thrust rings (Item 44) are interchangeable between front and rear. “Front” and “Rear” are used to denote their placement in relation to the inner magnet (Item 40). The “Front” bearing components are located between the inner magnet and the impeller, and the “Rear” components are located on the back side of the inner magnet farthest from the impeller.

10. Remove the front bushing (Item 42) from the bearing holder in the casing. Check that the bushing pin (Item 17) is securely in place, and not bent/damaged. Replace if damaged.
11. Remove the O-ring (Item 33) from the casing/ rear casing (Item 4). Replace at reassembly.
12. Holding onto the shaft, pull the shaft with inner magnet and rear thrust ring and rear sleeve in place.

! CAUTION !

THE REAR BUSHING IN THE BOTTOM OF THE REAR CASING MAY COME OUT WITH THE SHAFT ASSEMBLY. BE PREPARED TO HOLD/CATCH THE BUSHING AS THE SHAFT CLEARS THE REAR CASING.

13. Remove the rear bushing (Item 42) from the bearing holder at the bottom of the rear casing. Check that the bushing pin (Item 17) is securely in place, and not bent/damaged.

Replace if damaged.

14. Remove the impeller key (Item 15). Loosen the two set screws (Item 12) in the collar (Item 7) and slide the collar from the inner magnet shaft.
15. Slide the front sleeve, front thrust ring, inner magnet, and rear thrust ring off the inner magnet shaft.
16. Remove the inner magnet key (Item 16) from the inner magnet shaft. This allows the rear sleeve to slide off the inner magnet shaft.

REMOVAL OF MOTOR FROM PUMP UNIT

1. SEPARATING THE MAGNET COUPLING – Strong magnetic forces work to keep the inner magnet (Item 40) and outer magnet (Item 48) coupled. Removal of the motor (with the outer magnet still installed on the motor shaft) from the frame adapter (Item 50) is the easiest way to “break” the magnetic couple.



**BE CAREFUL TO AVOID TRAPPING YOUR FINGERS
BETWEEN THE PUMP END ASSEMBLY AND THE
MOTOR FLANGE.**

- a. Firmly secure the pump and motor unit to the worktable top by bolting or clamping.
- b. Support the motor to prevent it from falling from the frame adapter when the mounting bolts are removed. For heavy motors a lifting device (crane, chain-fall, etc.) is recommended to suspend the motor weight. Remove the hex head bolts connecting the motor to the frame adapter. The machined fit between the motor and the frame adapter is tight and the motor may remain in place once the mounting bolts have been removed. A rubber (dead blow) mallet and pry bar may be necessary to separate the motor from the frame adapter.
- c. With the motor still supported, and yet loose from the frame adapter, prepare to grasp the motor firmly to remove it from the frame adapter in one straight axial motion away from the frame adapter. The magnet forces will attempt to remain

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engaged, so it is important to have a firm grasp of the motor when pulling it from the adapter.

2. Pull the motor from the frame adapter in one straight axial motion, separating the magnet coupling. Keep metal objects away from the interior of the outer magnet to prevent sudden attraction to the magnets, possibly trapping fingers between the metal object, such as a wrench, and the magnet segments.

ASSEMBLY OF PUMP WET END – MPT151/201/251/252

Clean all parts and inspect for damage, such as fretting of shaft or gouges from broken Silicon Carbide (SiC) bearing components. Replace all damaged parts.

Clearances of the impeller and casing are very tight and important for optimal performance. Inspect impeller and casing for rotational wear marks; replace the impeller if marks are deeper than 0.002-0.004”.

Replace all O-ring elastomers and connection gaskets.

1. Slide the rear sleeve (Item 43) onto the inner magnet shaft (Item 5) and bottom the sleeve on the shaft shoulder, aligning the notch in the sleeve to fully expose the keyway in the shaft.

NOTE: The bushings (Item 42), sleeves (Item 43), and thrust rings (Item 44) are interchangeable between front and rear. “Front” and “Rear” are used to denote their placement in relation to the inner magnet (Item 40). The “Front” bearing components are located between the inner magnet and the impeller, and the “Rear” components are located on the back side of the inner magnet farthest from the impeller.

2. Slip the inner magnet key (Item 16) into the inner magnet shaft (Item 5) keyway.
3. Slide the rear thrust ring (Item 44) onto the inner magnet shaft and over the inner magnet key. The shiny side of the thrust ring must face away from the magnet.
4. Slide the inner magnet (40) onto the shaft, aligning the key and keyway.

NOTE: The end of the inner magnet stamped “FRONT” must face toward the keyed end (impeller end) of the shaft.

5. Slide the front thrust ring (Item 44) onto the inner magnet shaft, over the key and up against the inner magnet. The shiny side of the thrust ring must face away from the magnet.
6. Slide the front sleeve (Item 43) onto the inner magnet shaft and engage the notch on the sleeve with the inner magnet key.
7. Slide the metal collar (Item 7) onto the inner magnet shaft and up against the front sleeve. With the bottom end of the shaft resting on a solid surface, *WITHOUT MECHANICAL ASSISTANCE*, press firmly down on the collar, compressing the stack of sleeves, thrust rings, and inner magnet together, and set (tighten) the two set screws (Item 12) to hold the position of all the components.

8. Place the impeller key (Item 15) into the inner magnet shaft corresponding keyway.
9. Check the bushing pin (Item 17) in the bearing holder of the rear casing (Item 4) for damage and replace, as needed. Slide the rear bushing (Item 42) into the bearing holder such that the notch in the bushing engages the bushing pin. The bushing should be free to slightly rotate in both directions and stop against the bushing pin. The bushing pin prevents rotation during normal operation.
10. Place the frame adapter (Item 50) on the worktable with the motor end down and the pump end up. [*For 182TC/ 184TC motor frames ONLY: Place the adapter flange (Item 56) onto the pump end of the frame adapter and bolt into place with the four hex socket head capscrews (Item 67)*]
11. Place the rear casing into its registered fit in the pump end of the frame adapter (Item 50 – for 56C and 140TC motor frames). or the adapter flange (Item 56 – for 180TC motor frames).
12. Carefully slide, don't drop, the rotor assembly of inner magnet, inner magnet shaft, keys, collar and bearing components into the rear casing, preventing damage to the rear bearing components as the assembly bottoms in the rear casing.
13. Place O-ring (Item 33) into its corresponding groove in the rear casing.
14. Check the bushing pin (Item 17) in the bearing holder of the casing (Item 2) and replace as needed. Slide the front bushing (Item 42) into the bearing holder such that the notch in the bushing engages the bushing pin. The bushing should be free to slightly rotate in both directions and stop against the bushing pin. The bushing pin prevents rotation during normal operation.
15. Holding the front bushing in place in the casing, slide the casing onto the inner magnet shaft and locate the casing onto the rear casing, being careful not to damage the bearing components or O-ring.
NOTE: The front bushing is loose in the casing and may fall or slip out of seated position (with notch engaged with anti-rotation pin) if not held in place.
16. Compress the O-ring (Item 33) by evenly tightening in an alternating pattern the hex head capscrews (Item 69).
17. With the impeller key (Item 15) in place, slide the impeller (Item 1) onto the inner magnet shaft over the impeller key such that the hub on the impeller is facing away from the inner magnet to the front of the pump.
18. Place O-ring (Item 34) into its corresponding groove in the casing (Item 2).
19. Turn the impeller by hand to check for free rotation. If resistance or scraping/grinding is felt, or noises heard, dismantle, and inspect the pump to find the cause and take corrective action.
20. Slide the cover (Item 3) into place, locating with the casing. Complete the assembly with the hex socket head capscrews (Item 66), evenly tightening in an alternating pattern to prevent binding. These capscrews must be torqued in accordance with the fastener

torque table.

21. After installation of the motor, remove the motor fan cover and rotate the pump by hand by turning the motor fan. The pump should rotate smoothly without heavy resistance or noise. A slight “click” in either direction at the first turn is normal. Dry SiC components can “squeal” if rotated quickly by hand, which is also normal. However, limit the dry rotation of the rotor to only a few slow turns.
22. Install the casing drain plug (Item 14) into the casing NPT drain port.

INSTALLATION OF MOTOR ONTO BARE PUMP



1. ENGAGING THE MAGNET COUPLING – Strong magnetic forces work to keep the inner magnet (Item 40) and outer magnet (Item 48) coupled. Installation of the motor (with the outer magnet installed on the motor shaft) onto the frame adapter (Item 50) of the assembled pump requires “engaging” the magnetic couple.
 - a. Firmly secure the pump to the worktable top by bolting or clamping.
 - b. Insert the motor shaft key into the motor shaft keyway.
 - c. Install the outer magnet (Item 48) onto the motor shaft. The end of the motor shaft must be flush with the inside hub surface of the outer magnet. Keep metal

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objects away from the interior of the outer magnet to prevent sudden attraction to the magnets, possibly trapping fingers between the metal object, such as a wrench, and the magnet segments.

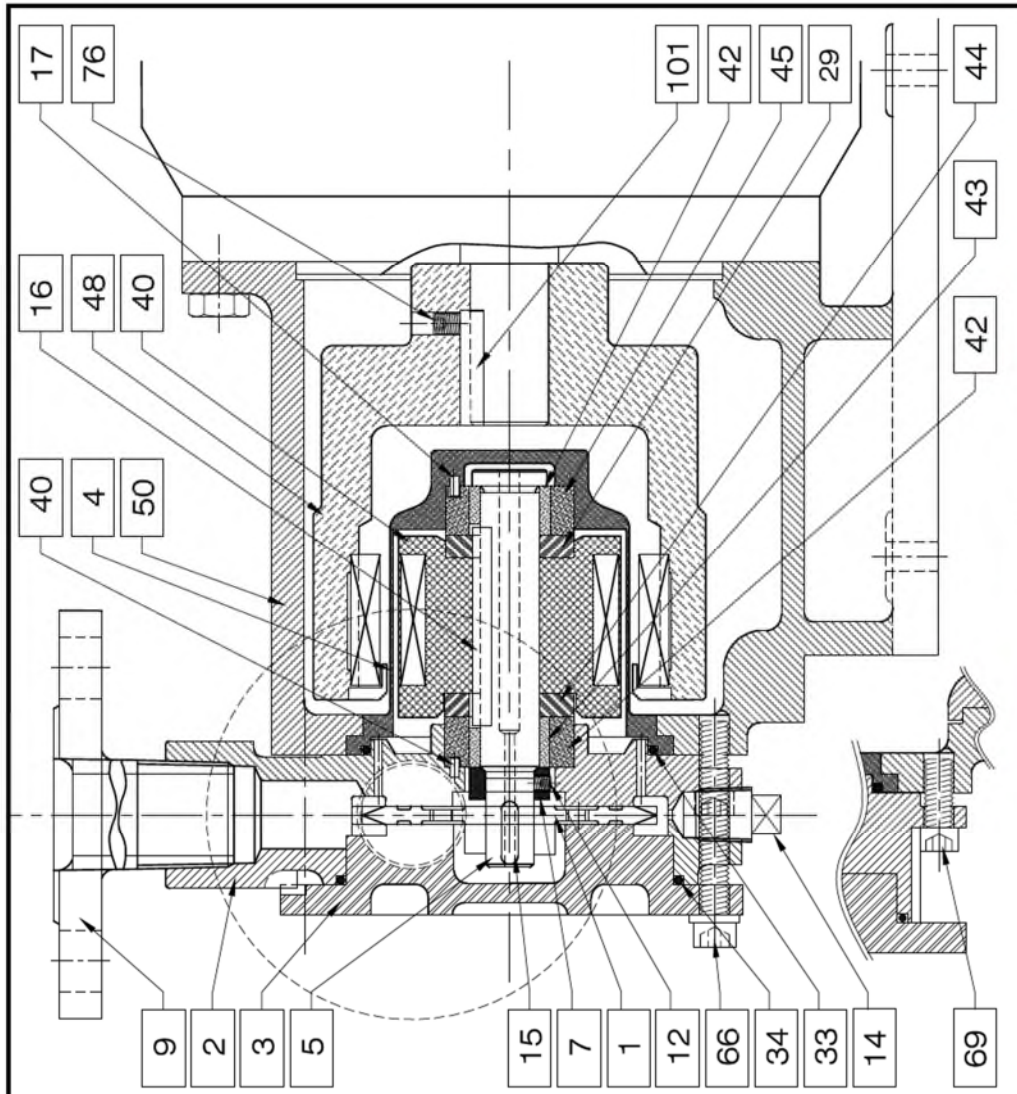
- d. Securely tighten the outer magnet set screw (Item 76). Inspect the magnet segments of the outer magnet to assure no loose metal objects have adhered to the segments.
- e. Support the motor to prevent it from falling from the frame adapter while positioning the motor for installation. For heavy motors a lifting device (crane, chain-fall, etc.) is recommended to suspend the motor weight.

- f. With the motor still supported, align the motor shaft centerline with the frame adapter centerline, yet keeping the motor away from the adapter to prevent inadvertent engagement of the magnet coupling. Prepare to grasp the motor firmly to move it toward the frame adapter in one straight axial motion away from the frame adapter. The outer magnet is aligned at this point to slip over the rear casing section of the pump. DO NOT ALLOW THE MOTOR TO STRIKE AGAINST THE

 **WARNING** 
**BE CAREFUL TO AVOID TRAPPING YOUR FINGERS
BETWEEN THE PUMP END ASSEMBLY AND THE
MOTOR FLANGE.**

FRAME ADAPTER AS THE MAGNET COUPLING ENGAGES! The magnetic forces will ENGAGE THE INNER AND OUTER MAGNET AS THEY ARE MOVED INTO CLOSE PROXIMITY OF EACH OTHER, so it is important to have a firm grasp of the motor when engaging the magnet coupling.

2. Locate the motor C-Face machined register into the corresponding diameter on the frame adapter, aligning the motor mounting bolt holes.
3. Install the (4) hex head capscrews (motor mounting bolts) and evenly tighten in an alternating pattern.
4. Check the pump for free rotation by hand. This easily accomplished with the motor fan cover removed for easy access.



MPT151-251 PARTS LIST

ITEM	QT	DESCRIPTION	MATL
101	1	COUPLING KEY (M)	STEEL
76	1	SET SCREW M8x8L	STEEL
69	2	HEXAGON SOCKET BOLT M8x30L	304SS
66	6	HEXAGON SOCKET BOLT M8x60L	304SS
50	1	FRAME ADAPTER	D.I.
48	1	OUTER MAGNET	NdFe
44	2	THRUST RING	SIC
43	2	SLEEVE	SIC-D
42	2	BUSHING	SIC
40	1	INNER MAGNET	NdFe
34	1	O RING	PTFE
33	1	O RING	PTFE
17	2	PIN Ø3x6L	316SS
16	1	COUPLING KEY (P)	316SS
15	1	IMPELLER KEY	316SS
14	1	PLUG 3/8" NPT	316SS
12	2	SET SCREW M5x6L	316SS
9	2	FLANGED PIPE (THREADED) NPT	316SS
7	1	COLLAR	316SS
5	1	SHAFT, INNER MAGNET WITH KEYS	316SS
4	1	REAR CASING	316SS
3	1	CASING COVER	CF-8M
2	1	CASING	CF-8M
1	1	IMPELLER	CF-8M



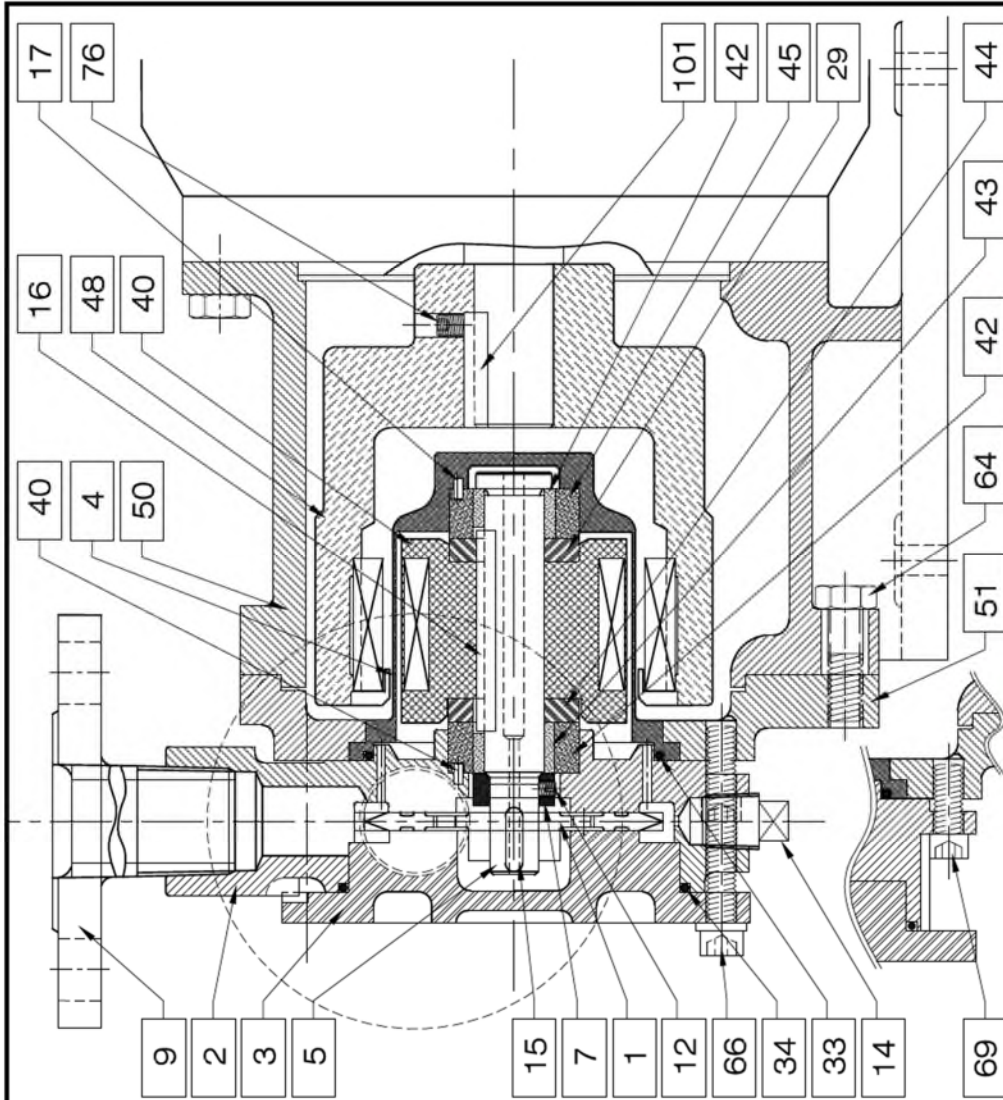
REVISIONS	NO.	DATE	COMMENT
1	8/5/19		GENERAL REVISION
2	2/24/22		NAME WAS SE-MPT151-252, NO ADAPTER
3			
4			
5			

MAGNATEX
Pumps, Inc.

SECTIONAL DRAWING
140TC MPT SERIES REGENERATIVE TURBINE PUMP

DRAWN BY: **B. VALENTIN** DATE: **04/15/09** SCALE: **1 OF 1** PAGE: **1**

SE-MPT151-251-140TC



MPT251-252 PARTS LIST

ITEM	QT	DESCRIPTION	MATL
101	1	COUPLING KEY (M)	STEEL
76	1	SET SCREW M8x8L	STEEL
69	2	HEXAGON SOCKET BOLT M6x30L	304SS
66	6	HEXAGON SOCKET BOLT M8x60L	304SS
51	1	ADAPTER RING	C.I.
50	1	FRAME ADAPTER	D.I.
48	1	OUTER MAGNET	NiFe
44	2	THRUST RING	STEEL
43	2	SLEEVE	SIC
42	2	BUSHING	SIC-D
40	1	INNER MAGNET	SIC
34	1	O RING	316SS
33	1	O RING	PTFE
17	2	PIN Ø3x6L	PTFE
16	1	COUPLING KEY (P)	316SS
15	1	IMPELLER KEY	316SS
14	1	PLUG 3/8" NPT	316SS
12	2	SET SCREW M5x6L	316SS
9	2	FLANGED PIPE (THREADED) NPT	316SS
7	1	COLLAR	316SS
5	1	SHAFT, INNER MAGNET WITH KEYS	316SS
4	1	REAR CASING	316SS
3	1	CASING COVER	CF-8M
2	1	CASING	CF-8M
1	1	IMPELLER	CF-8M



SECTIONAL DRAWING
 180TC MPT SERIES REGENERATIVE TURBINE PUMP
 DRAWN BY: B. VALENTIN DATE: 04/15/09 SCALE: NTS
 PAGE: 1 OF 1
 SE-MPT251-252-180TC

REVISIONS	NO.	DATE	COMMENT
Δ	1	8/9/19	GENERAL REVISION
	2	2/24/22	NAME WAS SE-MPT151-252, ADAPTER
	3		
	4		
	5		

MPT254 MAINTENANCE INSTRUCTIONS

DISASSEMBLY OF PUMP WET END

1. Remove the pump from the system for dismantling in the shop on a sturdy worktable. Secure the pump to the bench top with clamps or bolting.
2. Remove the (6) hex head casing cover bolts (Items 66) and pull the casing cover (Item 1) from the pump assembly. Inspect the casing interior for signs of wear or corrosive action from the pumped liquid. Remove the casing O-ring (Item 33) and discard it. A new gasket should be used at re-assembly of the pump.
3. SEPARATING THE MAGNET COUPLING – Strong magnetic forces work to keep the inner magnet (Item 40) and outer magnet (Item 48) coupled. Removal of the motor (with the outer magnet still installed on the motor shaft) from the frame adapter (Item 50) is the easiest way to “break” (disengage) the magnetic couple.
4. Working from the motor side of the pump, remove the (4) hex head capscrews securing the motor to the pump frame adapter.
5. Support the motor with a crane or blocks underneath the motor body to facilitate pulling the motor out on a straight line corresponding to the motor shaft centerline. Using a pry bar or flat blade screwdriver, work the motor loose from the machined fit between the motor C-face and the pump frame adapter at the small gap between the two pieces. It may be necessary to use a rubber or dead-blow mallet to loosen the motor fit.
6. Once the motor fit is loose allowing the motor to be removed, firmly grasp the motor and disengage the magnet coupling by pulling the motor out and in a straight line along the motor shaft axis, removing the motor with the outer magnet (Item 48) on the motor shaft.

WARNING

BE CAREFUL TO AVOID TRAPPING YOUR FINGERS BETWEEN THE MOTOR C-FACE FIT AND THE FRAME ADAPTER. PULL THE MOTOR OUT IN ONE MOTION UNTIL FREE OF THE FRAME ADAPTER AND THE MAGNETIC ATTRACTION OF THE MAGNET COUPLING.

7. If the motor is to be replaced, the outer magnet must be removed from the motor shaft. Loosen the (2) outer magnet set screws (Item 76) and pull the outer magnet from the motor shaft. Place the outer magnet in a plastic bag to protect it from attracting metallic particles that would cling to the magnet segments while the pump is dismantled. The plastic bag must be removed prior to re-assembly of the pump.
8. Place the pump assembly on the motor side of the pump frame adapter on a sturdy worktable. Remove the impeller set screw (Item 7A). Using a small cordless impact drill

- tool, remove the impeller nut (Item 7) from the pump shaft (Item 5). DO NOT use the impact tool during re-assembly to avoid breaking the Silicon Carbide (SiC) components.
9. Remove the impeller (Item 1) from the shaft and remove the impeller key (Item 15) from the shaft. Remove the distance piece (Item 13).
 10. Working from the pump side of the frame adapter, remove the (6) socket head capscrews (Item 62) securing the casing in preparation for removal. With care to prevent the SiC front bushing (Item 42) from falling out as the casing is removed, remove the pump casing (Item 2). Placing one hand under the casing as it is removed will catch the SiC bushing.
 11. Remove the SiC front bushing from the casing retaining bore. Inspect the screw (Item 30) for damage or looseness and replace if damaged and tighten if loose.
 12. Remove the SiC shaft sleeve (Item 43) and thrust ring (Item 44) from the shaft. Grasp the end of the shaft and pull it out of the rear casing, being careful to prevent the SiC rear bushing (Item 42) from falling if it comes out with the shaft. **The inner magnet (Item 40) is very strong and will attract metal objects. Be careful to not allow ferrous metal tools near the magnet to prevent trapping fingers between the tool and the magnet.**
 13. Working with the shaft (Item 5) and magnet assembly, remove the sleeve bolt set screw (Item 6A). Unscrew the sleeve bolt (Item 6) using a hand wrench while holding the inner magnet and the wrench end on the sleeve bolt. (DO NOT place the inner magnet in a vise to prevent damage to the magnet cladding.) Holding the inner magnet and shaft assembly with both hands, strike the free end of the wrench on the worktable to loosen the right-hand threaded sleeve bolt. Once loosened, remove the sleeve bolt by hand, and remove the SiC rear shaft sleeve (Item 43) and thrust ring (Item 44).
 14. Remove the shaft and inner magnet key (Item 16) from the inner magnet.
 15. Working with the rear casing (Item 4), inspect the anti-rotation pin (Item 17) in the bushing bore at the bottom for damage or looseness, and replace if damaged. If not removed in step 10 above, remove and discard the rear casing O-ring (Item 34). Remove the rear casing for inspection by removing the (6) hex nuts (Item 63) and pulling the rear casing from the frame adapter. This completes the dismantling of the pump.

INSPECTION OF USED PARTS – REPLACE OR RE-USE?

Inspect all parts for wear. The following are not rigid rules, but guidelines which should be used with all the service conditions in consideration, including safety concerns, i.e. what are the consequences of placing a used part back in service should it fail? In general, Magnatex recommends returning a pump to like new condition when re-building a pump or when pressure components show signs of wear. Use your best judgement with safety in mind.

1. Chatter marks on the SiC components are allowed if the surfaces are still smooth. Cracks or chips in the SiC components are not allowed. Used SiC components may be re-used if a dye penetrant NDE test reveals no “hairline” cracks.
2. Remove any burrs from metal components, particularly in any bore fit to allow easy

assembly. All of the internal pump components are “slip-fit” construction and pieces should not be forced together.

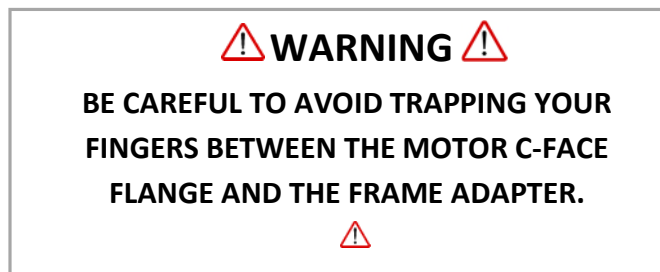
3. When inspecting the rear casing the mechanic should look for:
 - a. Signs of mechanical wear such as scratches, gouges (from broken SiC), or swirl (scalloped) marks at the bottom of the rear casing in the largest diameter, which indicates solids are in the pumped liquid. If the SiC bearing fits can be cleaned up to allow smooth insertion of the SiC bushing and the casing walls are not breached (damage less than 15% of wall thickness and less than 25% of the combined surface area) the rear casing may be placed back in service after a hydrostatic test of 150% of MAWP. Otherwise, Replace.
 - b. The original machine marks are typically visible and can be felt by dragging a small piece of hard plastic along the ID of the can portion. If you know the part is clean of chemicals, etc. a fingernail works well for this. If the surface is smooth indicating chemical action on the can portion the thickness should be measured and recorded for monitoring on subsequent inspections. A reduction of 10% of the wall thickness indicates time for replacement. A reduction of 5% in a year indicates close monitoring is required and a change in materials of construction should be considered.
 - c. Dents. Not allowed. Replace.
 - d. Swollen or bulging side walls of the can portion. Not Allowed. Replace.
4. The motor should be checked electrically by qualified personnel or motor shop to determine the condition of the motor prior to placing it back in service.

ASSEMBLY OF PUMP WET END

1. Working with the inner magnet shaft (Item 5), place the sleeve key (Item 8C) into the key slot on the shaft.
2. Slide a thrust ring (Item 44) on to the shaft sleeve bolt end, engaging the groove in the thrust ring. should face the inner magnet and the notch should engage the exposed, rounded portion of the inner magnet key.
3. Slide a sleeve (Item 43) on to the inner magnet shaft and engage the remaining portion of the sleeve key with the notch on the end of the sleeve.
4. Thread the sleeve bolt (Item 6) into the inner magnet shaft. Torque the sleeve bolt to 22 ft-lbs. (29 Nm) and secure with the sleeve bolt set screw (Item 6A), torqued to 15 in-lbs. (1.5 Nm).
5. Still working with the shaft, place the inner magnet key (Item 16) with material stamp facing up into the corresponding inner magnet shaft keyway. Slide the inner magnet (Item 40) onto the shaft from the impeller end of the shaft. The embossed numbers on the magnet end (magnet size) should face the motor (rear) side of the pump. “Front” is stamped on the side of the magnet that faces the impeller end of the pump.

6. Thread a set bolt (Item 30) into the tapped hole in the inner magnet thrust ring bore from the impeller end (FRONT) and tighten securely. Engage the set bolt with the hole on the back of the thrust ring (Item 44) while placing the thrust ring into the corresponding bore on the front of the inner magnet.
7. Place the shaft sleeve (Item 43) on the inner magnet shaft, engaging the slot in the end of the shaft sleeve with the remaining end portion of the inner magnet key. Place the distance piece (Item 13) onto the shaft following the shaft sleeve.
8. Now working with the rear casing (Item 4), place the anti-rotation pin (Item 17) into the rear bearing holder at the bottom of the rear casing can. Tap it in place to the limit of travel. Carefully slide a bushing (Item 42) into the rear bearing holder and engage the set bolt with the notch on the bottom of the bushing. Be sure the bushing notch has engaged the set bolt and is “bottomed” into the bushing holder. The bushing should be loose enough to move slightly side to side with the motion being restrained by the set bolt.
9. Place the frame adapter (Item 50) onto a sturdy worktable with the motor end face down. Install the rear casing onto the frame adapter with the machined fit locating the registered fit. Install the rear casing hex nuts (Item 63) and torque to 31 ft-lbs. (42 Nm).
10. Lift the inner magnet assembly by the shaft and slowly slide it into the rear casing. Be careful of the tight tolerances between the rear bushing and sleeve. This should only be done when the outer magnet is removed and is easiest in the vertical position.
11. Working with the pump casing (Item 2) install the set bolt (Item 30) into the tapped hole of the bushing holder in the casing and tighten securely. Insert the bushing (Item 42) into the bushing holder of the casing, engaging the slot in the bushing end over the set bolt head. The bushing should be loose enough to move slightly side to side with the motion being restrained by the set bolt.
12. Install the back casing O-ring (Item 34) onto the machined spigot of the casing.
13. Holding the front bushing in place in the pump casing bushing holder, invert the casing and slip it over the threaded shaft end, being careful of the tight tolerances between the bushing and sleeve, and engaging the machined fit of the casing and rear casing. Align the suction and discharge ports to the top of the pump ensuring the internal flush ports are aligned on the vertical centerline.
14. Insert the impeller key (Item 15) into the shaft keyway with the material stamp facing up. Slide the impeller onto the shaft, engaging the impeller key.
15. Partially thread the impeller nut set screw (Item 7A) into the impeller nut (Item 7) allowing clearance for the shaft threads. The set screw should not engage the threads at this point in the assembly.
16. Bolt the casing to the rear casing using the (6) socket head bolts (Item 62). Tighten the bolts evenly to avoid binding, and torque to 18 ft-lbs. (24 Nm). The rotor assembly should still rotate easily by hand.

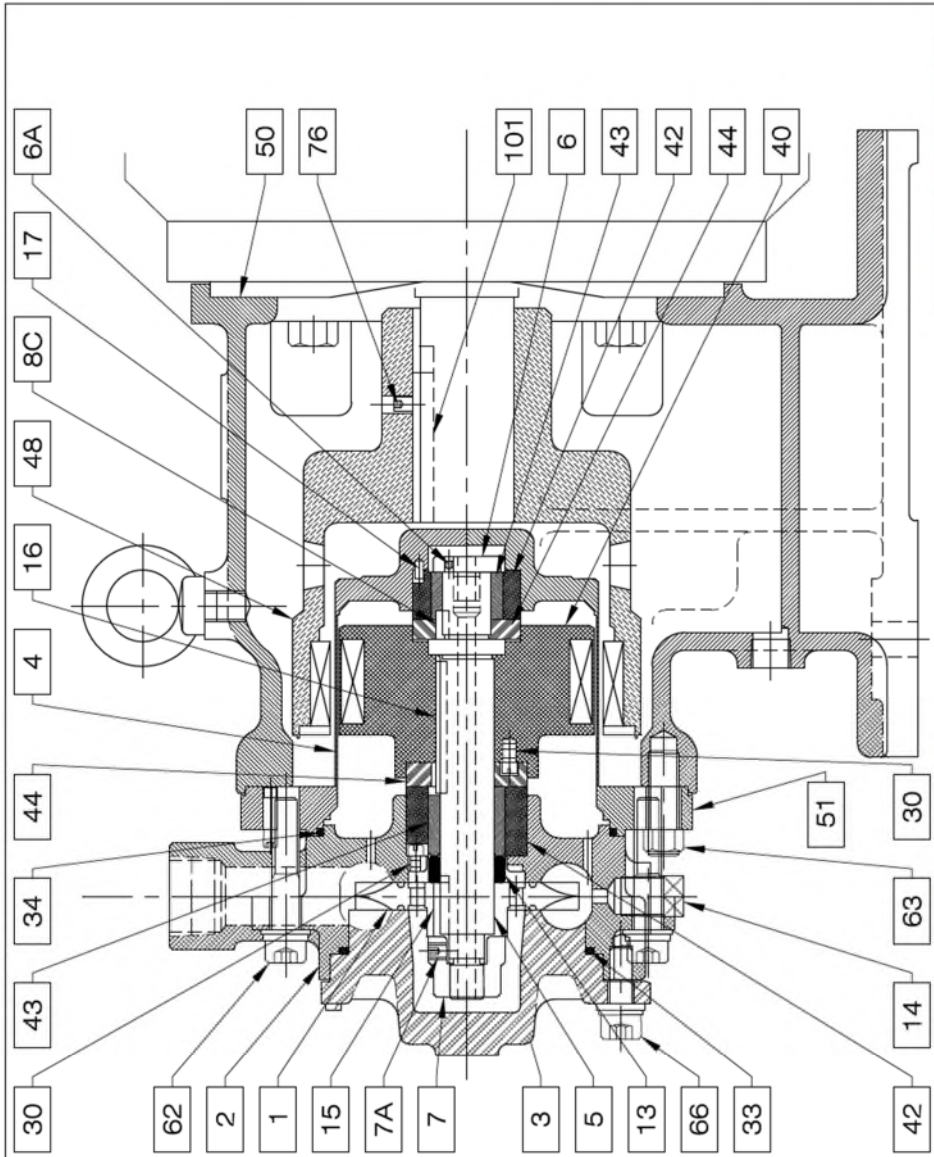
17. Thread the impeller nut onto the shaft. Working through the discharge and suction ports of the pump, block the impeller from rotation and torque the impeller nut to 34 ft-lbs. (45 Nm). Secure the impeller nut with the set screw, torquing the set screw to 22ft-lbs. (2.4 Nm). Remove the blocking measure of the impeller. Check again for easy rotation of the rotor.
18. Install the casing cover O-ring (Item 33) onto the casing cover (Item 3). Place the casing cover onto the casing, engaging the registered fit and being careful to not pinch the O-ring against the casing. There should be an even gap between the cover and the casing.
19. Install the (6) socket head bolts (Item 66) to secure the casing cover to the casing. Evenly tighten and torque the bolts to 18 ft-lbs. (24 Nm).
20. Install the motor key (Item 101) into the motor shaft keyway. Mount the outer magnet (Item 48) on the motor shaft, such that the end of the motor shaft is flush with the inside of the outer magnet hub surface. Tighten the outer magnet set screw (Item 76, torquing to 53 in-lbs. (6.0 Nm). Ensure that no foreign metallic objects come in contact with the outer magnet that could be attracted to the magnet segments. Remove any metal shavings or grinding particles that have become attracted to the magnets using the adhesive side of tape or similar material. Check the motor shaft rotation by hand.
21. Place the assembled pump and frame adapter onto the surface of the worktable on the feet of the frame adapter. Secure the frame adapter to the table to prevent movement when mounting the motor in the next steps. Lifting equipment should be utilized to lift and suspend the motor for mounting.
22. Read this step fully prior to proceeding. Install the motor to the frame adapter using



caution as strong magnetic forces will pull the magnets together. Carefully position the outer magnet to align and fit over the rear casing, but not on it yet, without touching the sides of the rear casing can or the magnet segments of the outer magnet. [The magnet coupling will engage in this next step of the assembly and, if the motor is unrestrained, will rapidly accelerate the outer magnet into engagement pulling the motor along at the same time.] With the motor aligned as mentioned, slowly move the motor to the frame adapter to engage the magnet coupling. Ensure the motor flange pilot spigot engages the machined recess on the frame adapter and is square to the frame adapter flange face. A small AND EVEN motor flange gap is normal.

23. Install the (4) hex head capscrews mounting the motor to the frame adapter and tighten evenly and securely.

24. Make a final inspection by turning the pump and motor unit by hand from the fan end of the motor with the fan cover removed. Rotation should be free without hard spots. Dry silicon carbide components may make a chattering sound when the rotor is turned by hand. This is normal. If resistance or scraping is felt, or if crunching noises are heard (grinding, etc.), inspect the pump to determine the cause, and take corrective action. [A faint clicking noise as the bushing bears against the anti-rotation set bolts is normal. The click will be heard only once each time the direction of rotation is changed.]
25. Review the assembly procedure and make sure all steps were accomplished. The pump is ready to be returned to service or placed in stores inventory.



REVISION		△ ALL DIMENSIONS ± 0.12" [3mm]	INT
CONFIDENTIAL	NO	DATE	COMMENT
1	2/24/22	NAME WAS SE-MPT254, ADAPTER	KJH
2			
3			

APPROVED
By: [Signature]

MAGNATEX
P U M P S I N C .
SECTIONAL DRAWING
250TC MPT SERIES REGENERATIVE TURBINE PUMP
K J H P R
REVISED 2/24/22
PAGE 1 OF 1
SE - MPT254 - 250TC
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MPT254 PARTS LIST

ITEM	QTY	DESCRIPTION	MAT'L
101	1	COUPLING KEY (M)	STEEL
76	2	SET SCREW M6x8L	SCM435
66	6	HEXAGON SOCKET BOLT M10x25L	304SS
63	4	STUD & HEXAGON NUT M12x30L	409SS
62	6	HEXAGON SOCKET BOLT M10x60L	304SS
51	1	ADAPTER RING	C.I.
50	1	FRAME ADAPTER	D.I.
48	1	OUTER MAGNET	NdFe
44	2	THRUST RING	SIC
43	2	SLEEVE	SIC
42	2	BUSHING	SIC
40	1	INNER MAGNET	NdFe
34	1	O RING	PTFE
33	1	O RING	PTFE
30	2	SCREW M6	316SS
17	1	PIN Ø4x8L	316SS
16	1	COUPLING KEY (P) 5x5x56L	316SS
15	1	IMPELLER KEY 6x6x22L	316SS
14	1	PLUG R3/8	316SS
13	1	DISTANCE PIECE	316SS
8C	1	SLEEVE KEY 6x6x12L	316SS
7A	1	SET SCREW M6x8L	316LSS
7	1	IMPELLER NUT	316SS
6A	1	SET SCREW M5x5L	316SS
6	1	SLEEVE BOLT	316SS
5	1	SHAFT, INNER MAGNET W/ KEYS	316SS
4	1	REAR CASING	316SS
3	1	CASING COVER	CF-8M
2	1	CASING	CF-8M
1	1	IMPELLER	316SS