

TECHNICAL SERVICE MANUAL: INSTALLATION, OPERATION & MAINTENANCE



MOTOR SPEED PRODUCT LINE: *DUCTILE IRON*
 SG-804 SERIES™, SG-805 SERIES™, SGN-805 SERIES™,
 SG-807 SERIES™, SGN-807 SERIES™,
 SG-810 SERIES™, SG-814 SERIES™

TSM 1453
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MODEL NUMBER CHART

| Ductile Iron | (Discontinued 4Q22) |
|--|---|
| SG-80417 SG-80418 SG-80425 SG-80435 SG-80450 SG-80470 | |
| SG-80518 SG-80525 SG-80535 SG-80550 SG-80570 SG-80510 SG-80514 SG-80519 SG-80528 | SGN-80518 SGN-80525 SGN-80535 SGN-80550 SGN-80570 SGN-80510 SGN-80514 SGN-80519 SGN-80528 |
| SG-80741 SG-80758 SG-80782 SG-80711 SG-80716 SG-80722 SG-80732 | SGN-80741 SGN-80758 SGN-80782 SGN-80711 SGN-80716 SGN-80722 SGN-80732 |
| SG-81009 SG-81013 SG-81026 | |
| SG-81420 SG-81436 SG-81456 | |

INTRODUCTION

The illustrations used in this manual are for identification purposes only and cannot be used for ordering parts.
 Obtain a parts list from your Viking Pump® representative. Always give a complete name of part, part number and material with the model number and serial number of pump when ordering repair parts. The unmounted pump or pump unit model number and serial number are on the nameplate. This manual only applies to the pump models specified in the **"Model Number Chart" on page 1**. Pump specifications and recommendations are listed in the Catalog Sections, which are available at vikingpump.com.

FIGURE 1:
SG-807 SERIES™
 (SHOWN WITH B DRIVE)

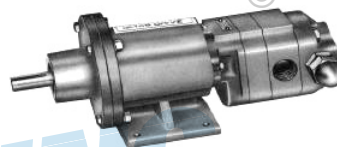


FIGURE 2:
SG-810 SERIES™
 (SHOWN WITH M DRIVE)



NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

SAFETY INFORMATION & INSTRUCTIONS

IMPROPER INSTALLATION, OPERATION OR MAINTENANCE OF PUMP MAY CAUSE SERIOUS INJURY OR DEATH, AND/OR RESULT IN DAMAGE TO PUMP AND/OR OTHER EQUIPMENT. VIKING'S WARRANTY DOES NOT COVER FAILURE DUE TO IMPROPER INSTALLATION, OPERATION OR MAINTENANCE.

THIS INFORMATION MUST BE FULLY READ BEFORE BEGINNING INSTALLATION, OPERATION OR MAINTENANCE OF PUMP, AND MUST BE KEPT WITH PUMP. PUMP MUST BE INSTALLED, OPERATED AND MAINTAINED ONLY BY SUITABLY TRAINED AND QUALIFIED PERSONS.

THE FOLLOWING SAFETY INSTRUCTIONS MUST BE FOLLOWED AND ADHERED TO AT ALL TIMES.

 **DANGER** = FAILURE TO FOLLOW THE INDICATED INSTRUCTION MAY RESULT IN SERIOUS INJURY OR DEATH.

 **WARNING** = IN ADDITION TO SERIOUS INJURY OR DEATH, FAILURE TO FOLLOW THE INDICATED INSTRUCTION MAY CAUSE DAMAGE TO PUMP AND/OR OTHER EQUIPMENT

DANGER

BEFORE opening any liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) be sure that:

- Any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.
- The pump drive system (motor, turbine, engine, etc.) has been "locked out" or otherwise been made non-operational, so that it cannot be started while work is being done on the pump.
- You know what material the pump has been handling, have obtained a material safety data sheet (MSDS) for the material, and understand and follow all precautions appropriate for the safe handling of the material.

DANGER

BEFORE operating the pump, be sure all drive guards are in place.

DANGER

DO NOT operate pump if the suction or discharge piping is not connected.

DANGER

DO NOT place fingers into the pumping chamber, or its connection ports, or into any part of the drive train if there is any possibility of the pump shaft being rotated.

WARNING

DO NOT exceed the pumps rated pressure, speed, and temperature, or change the system/duty parameters from those the pump was originally supplied, without confirming its suitability for the new service.

WARNING

BEFORE operating the pump, be sure that:

- It is clean and free from debris.
- All valves in the suction and discharge pipelines are fully opened.
- All piping connected to the pump is fully supported and correctly aligned with the pump.
- Pump rotation is correct for the desired direction of flow.

WARNING

INSTALL pressure gauges/sensors next to the pump suction and discharge connections to monitor pressures.

WARNING

USE extreme caution when lifting the pump. Suitable lifting devices should be used when appropriate. Lifting eyes installed on the pump must be used only to lift the pump, not the pump with drive and/or base plate. If the pump is mounted on a base plate, the base plate must be used for all lifting purposes. If slings are used for lifting, they must be safely and securely attached. For weight of the pump alone (which does not include the drive and/or base plate) refer to the Viking Pump® product catalog.

DANGER

DO NOT attempt to dismantle a pressure relief valve that has not had the spring pressure relieved or is mounted on a pump that is operating.

DANGER

AVOID contact with hot areas of the pump and/or drive. Certain operating conditions, temperature control devices (jackets, heat-tracing, etc.), improper installation, improper operation, and improper maintenance can all cause high temperatures on the pump and/or drive.

WARNING

THE PUMP must be provided with pressure protection. This may be provided through a relief valve mounted directly on the pump, an in-line pressure relief valve, a torque limiting device, or a rupture disk. If pump rotation may be reversed during operation, pressure protection must be provided on both sides of pump. Relief valve adjusting screw caps must always point towards suction side of the pump. If pump rotation is reversed, position of the relief valve must be changed. Pressure relief valves cannot be used to control pump flow or regulate discharge pressure. For additional information, refer to **Appendix, General Installation Notes**, item 5 on Pressure Protection or contact your Viking Pump® representative for Engineering Service Bulletin ESB-31.

WARNING

THE PUMP must be installed in a manner that allows safe access for routine maintenance and for inspection during operation to check for leakage and monitor pump operation.

NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

SPECIAL INFORMATION

ROTATION

Viking Mag Drive® pumps are designed to run in a designated direction, which is indicated on the nameplate. Shaft rotation determines which port is suction and which is discharge.

Running the pump in the opposite direction may seriously affect the performance of the unit, and the relief valve (if present) will not operate. If rotation must be reversed, contact your Viking Pump supplier for instructions and parts to change over.

PRESSURE RELIEF VALVES

1. A pressure relief valve is mounted as standard on the SG- and SGN- magnetically coupled pumps.
2. Viking pumps are positive displacement pumps and must be provided with some sort of pressure protection. Without pressure protection, if the discharge line is blocked or becomes closed, pressure will build up until the motor stalls, drive equipment fails, a pump part breaks, or the piping and/or other equipment in the system bursts. This may be an integral pressure relief valve supplied with the pump, a torque limiting device or a rupture disk.
3. Do not use decoupling of magnets as protection from over pressure. SG- and SGN- pumps can develop potentially damaging pressure before the magnets decouple. Decoupling of the magnets may also cause damage to the magnets themselves.
4. Relief valve adjusting screw cap must **always** point towards suction side of pump See “Figure 3” on page 3 or “Figure 4” on page 3.
5. Pressure relief valves cannot be used to control pump flow or regulate discharge pressure.

For additional information on pressure relief valves, Refer to **Appendix, General Installation Notes**, item 5 on Pressure Protection, or contact your Viking Pump® representative for Engineering Service Bulletin ESB-31.

CAUTION !

Rare earth magnets used in couplings have extremely strong magnetic fields capable of changing performance or damaging items such as the following:

- Pacemakers
- Metal Implants
- Watches
- Computers
- Cellular or Mobile Devices
- Credit Cards

MAINTENANCE

These pumps are designed for long, trouble-free service life under a wide variety of application conditions with minimum maintenance. The points listed below will help provide long service life.

CLEANING PUMP

Keep pump, coupling and motor as clean as possible. This will facilitate inspection, adjustment and repair work.

STORAGE

If the pump or coupling are to be stored, drain pump and pour non-detergent SAE 30 weight oil into pump port. Apply grease to pump or coupling shaft extension, if present or accessible. Viking suggests rotating the pump shaft every 30 days to circulate the oil in the pump. The pump and coupling should be stored in a dry area. **Note:** if the liquid to be pumped reacts with oil, use an acceptable alternative.

SUGGESTED REPAIR TOOLS

The following tools must be available to properly repair these pumps. These tools are in addition to standard mechanics' tools such as open-end wrenches, pliers, screwdrivers, etc. Most of the items can be obtained from an industrial supply house.

1. Soft headed hammer
2. Allen wrench set (SAE)
3. Internal snap ring pliers (for bearing carriers only)
Viking Part No. 2-810-029-047-999
4. External snap ring pliers Viking Part No. 2-810-029-375
5. Arbor press
6. Torque wrench

FIGURE 3: SG-804 SERIES™, SG-805 SERIES™, SGN-805 SERIES™, SG-807 SERIES™, SGN-807 SERIES™

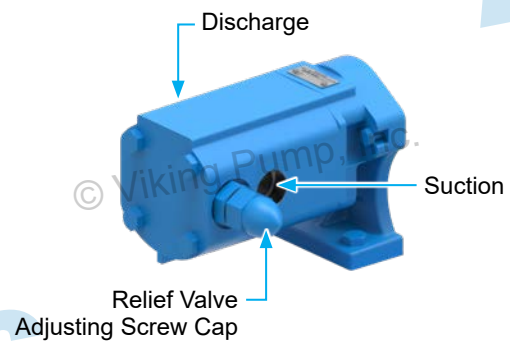
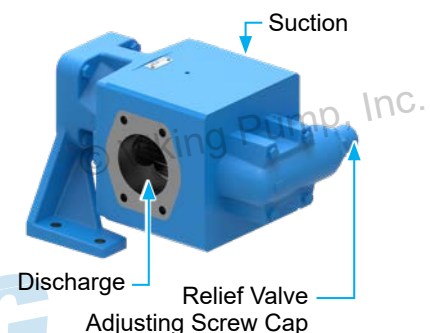
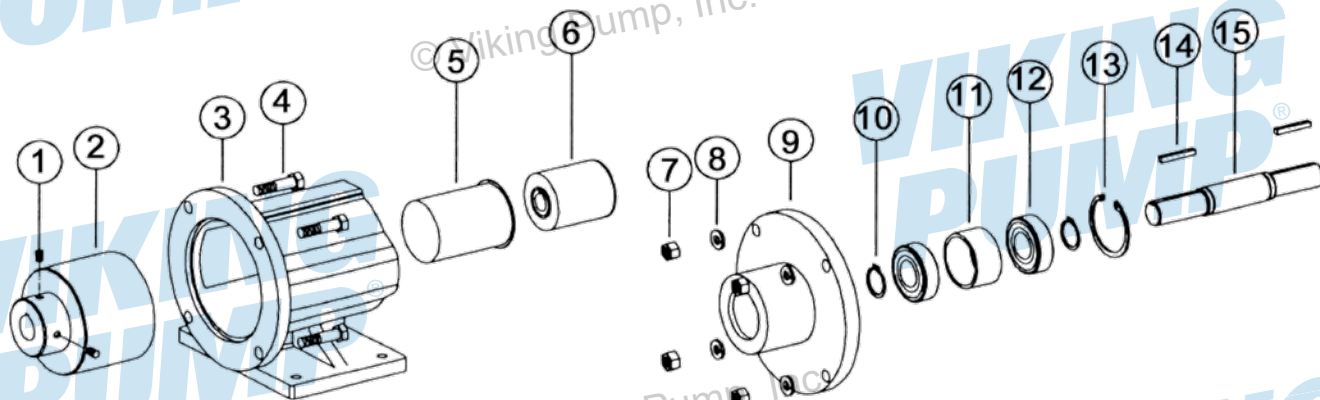


FIGURE 4: SG-810 SERIES™, SG-814 SERIES™



NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

FIGURE 5: EXPLODED VIEW (MD-A & MD-B COUPLING)



| Item | Name Of Part | Item | Name Of Part | Item | Name Of Part |
|------|---|------|--------------------------------------|------|--------------------------|
| 1 | Setscrews, Outer Magnets (2 Req'd) | 6 | Inner Magnet Assembly (2 Bore Sizes) | 11 | Bearing Spacer |
| 2 | Outer Magnet Assembly (3 Bore Sizes) | 7 | Hex Nut (4 Req'd) | 12 | Ball Bearing (2 Req'd) |
| 3 | Bracket, Footed or Footless | 8 | Lock Washer (4 Req'd) | 13 | Retaining Ring, Internal |
| 4 | Capscrew for Motor or Bearing Carrier (4 Req'd) | 9 | Bearing Housing | 14 | Key (2 Req'd) |
| 5 | Canister | 10 | Retaining Ring, External (2 Req'd) | 15 | Shaft |

⚠ DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) be sure:

1. That any pressure in the chamber has been completely vented through the suction or discharge lines, or other appropriate openings or connections.
2. That the driving means (motor, turbine, engine, etc.) has been "locked out" or made non-operational, so that it cannot be started while work is being done on pump.
3. That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.

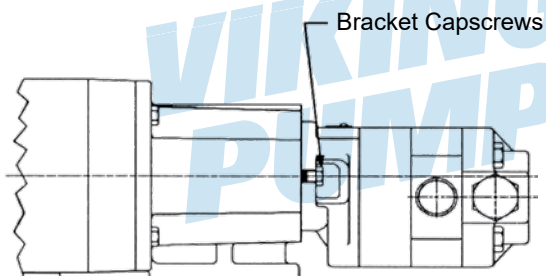
Failure to follow above listed precautionary measures may result in serious injury or death.

MD-A & MD-B COUPLING PUMP REMOVAL

Read all of the instructions before proceeding with disassembly of the coupling and/or pump.

1. Remove piping from the ports and remove the mounting capscrews securing the pump to the bracket (See "Figure 6" on page 4). Support larger pumps with an overhead hoist if possible.
2. The canister will probably be full of liquid. Use care while removing from the pump and pull straight off mounting bracket (see "Figure 7" on page 5). Remove the external snap ring (closest to end of shaft), and slide off the inner magnet assembly (See "Figure 8" on page 5). Use caution, as this is a very strong magnet.
3. Do not remove the bracket O-ring unless it is damaged, especially if it is PTFE (Derivative) Encapsulated. If a new O-ring is required, follow instructions in the "Pump Assembly (SG-804 Series™, SG-805 Series™, SGN-805 Series™, SG-807 Series™, SGN-807 Series™)" on page 7.
4. You should be able to visually inspect the outer magnets from the end of the bracket. If magnet removal is necessary, start by removing the (4) capscrews and separating the bracket from the motor or bearing carrier (See "Figure 9" on page 5). Loosen the setscrews in the outer magnet assembly to pull assembly off the shaft. If the unit features a bearing carrier, the bearings should not require maintenance since they are sealed. If necessary, disassemble the bearing carrier by removing the single internal retaining ring (See "Figure 5" on page 4), then press the shaft and bearings out of the housing. Remove the external retaining rings from the shaft to remove bearings.

FIGURE 6



(2) Required for SG-807 with MD-A Coupling
 (4) REQUIRED FOR ALL SG-804 & SG-805, & SG-807 WITH MD-B COUPLING

NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

FIGURE 7

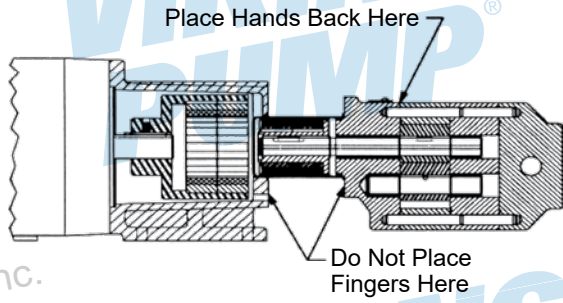


FIGURE 8

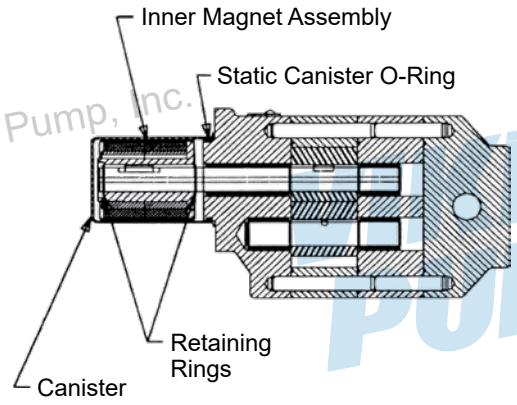


FIGURE 9

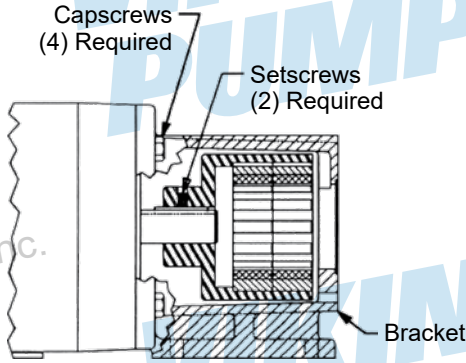
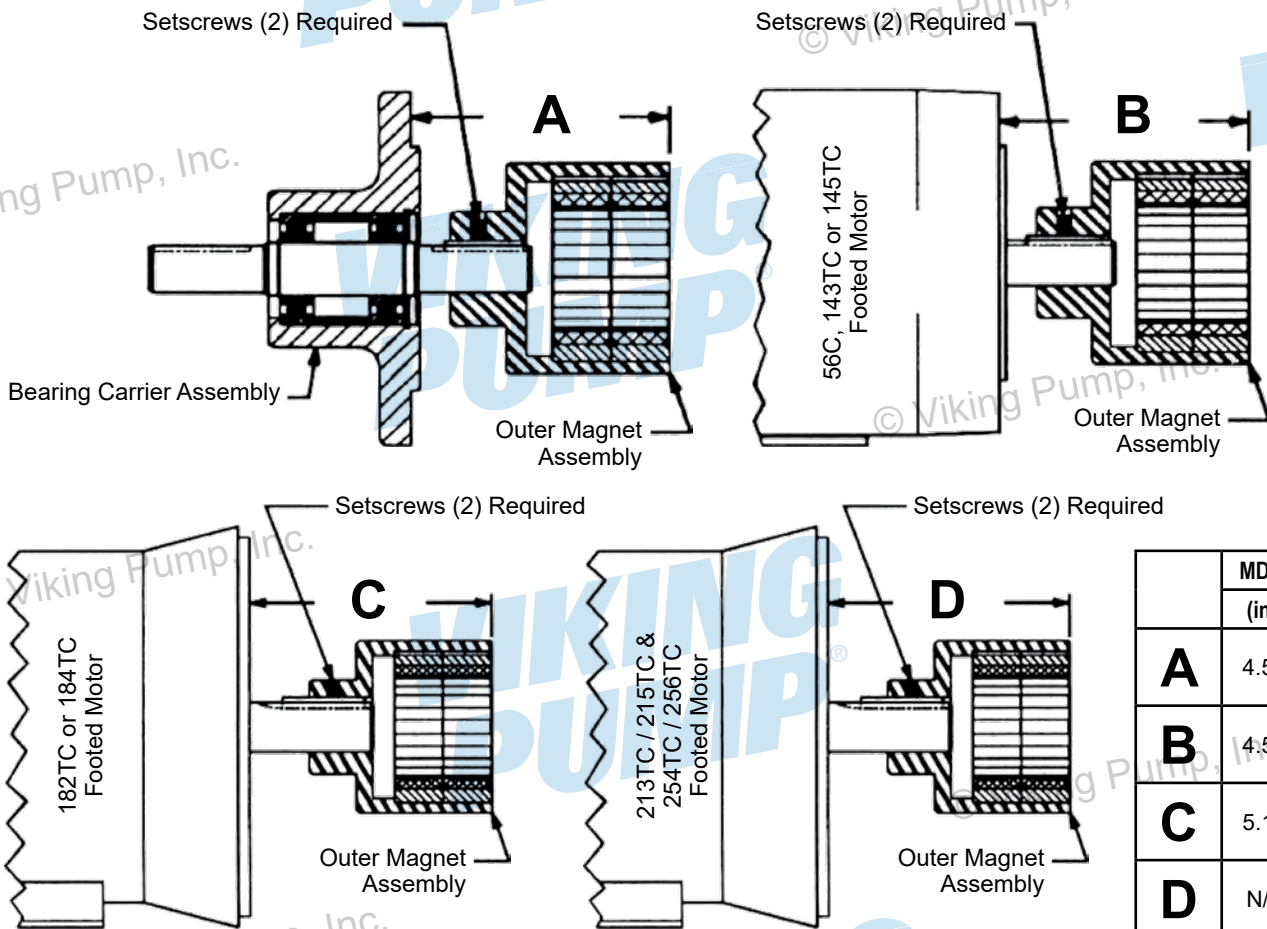


FIGURE 10



| | MD-A (in.) | MD-B (in.) |
|---|---------------|---------------|
| A | 4.56 | 6.82 |
| B | 4.56 | N/A |
| C | 5.16 | 6.82 |
| D | N/A | 6.82 |

NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

FIGURE 11: TYPICAL SG-804 SERIES™, SG-805 SERIES™, SGN-805 SERIES™

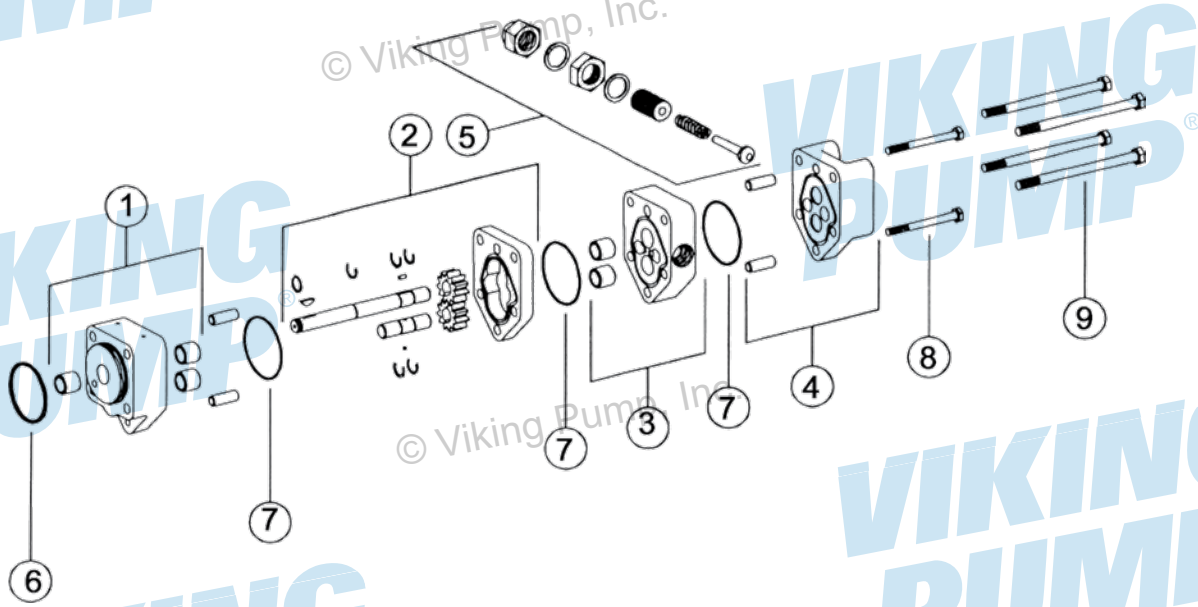
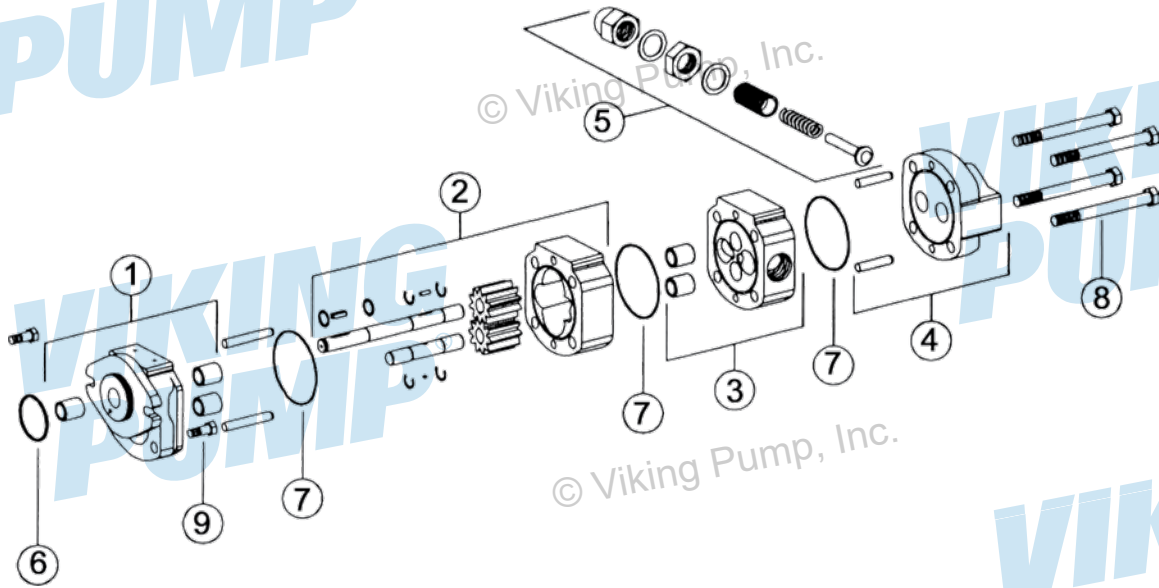


FIGURE 12: TYPICAL SG-807 SERIES™, SGN-807 SERIES™



| Item | Name Of Part | Item | Name Of Part | Item | Name Of Part |
|------|--|------|----------------------------------|------|----------------------------------|
| 1 | Bracket & Bearing Assembly | 4 | Head & Alignment Sleeve Assembly | 7 | O-ring (Between Sections) |
| 2 | Match Ground Casing & Gears, Driver & Driven Shafts with Snap Rings & Drive Pin/ball | 5 | Relief Valve Kit | 8 | Assembly Cap screws (4 Required) |
| 3 | Separation Plate & Bearing Assembly | 6 | O-ring (Bracket) | 9 | Mounting Cap screws (2 Required) |

PUMP DISASSEMBLY (SG-804 SERIES™, SG-805 SERIES™, SGN-805 SERIES™, SG-807 SERIES™, SGN-807 SERIES™)

Before attempting to repair the pump, make sure that all of the details covered in **Appendix, Troubleshooting** have been reviewed. Disassembly of a good pump should be avoided if possible. Due to pump construction and close tolerances used in the pump manufacture, repair is seldom economically feasible, unless it is an O-ring or seal. Often when an internal part wears such as a bushing, shaft or gear, it will cause excessive wear in other mating parts. In this case, more components will be required to rebuild the pump back to original condition than originally expected.

The SG-804 Series™, SG-805 Series™, SG-807 Series™ pump ends do not lend themselves to being rebuilt. If the plates on either side of the gears show wear, then the gears also are likely worn. The cost of replacement would be less than the cost of the required parts and labor.

The only parts recommended for replacement in the pump are the o-rings, and must be replaced if the pump is disassembled. These instructions are to be used in conjunction with the **APPENDIX** to assist in inspection and, if warranted, repair of these pumps.

For additional information, contact your Viking Pump® representative to obtain a copy of TR-809 (SG-805 Series™) or TR-810 (SG-807 Series™).

Mark all sections of the pump during disassembly to ensure they will be reassembled in the proper order and orientation. Note: The pump must be separated from coupling to disassemble (See **“MD2-B Coupling Disassembly” on page 11** or **“MD2-C Coupling Disassembly” on page 11**).

1. Remove the assembly capscrews (item 8, **“Figure 11” on page 6** or **“Figure 12” on page 6**).
2. Remove the key and the second retaining ring from the driver shaft.
3. The pump is now held together only by the alignment sleeves. Hold the head of the pump and gently tap on the sides of the pump bracket with a soft headed hammer, alternating sides of the pump. This should slowly separate the sections. Do not hit the sections hard or use a screwdriver to pry them apart. This may damage the mating surfaces.
4. After the pump is disassembled, inspect all parts for signs of wear. Look carefully at the shaft, bushings, inside of the casing, gear teeth, and the flat sections located on each side of the casing for sign of wear.
5. Visually inspect the bracket O-ring. Do not remove it unless planning to replace, especially if it is an encapsulated O-ring. If the O-rings located between the sections are PTFE (appear to be white), it is strongly recommended to replace rather than reuse.
6. Remove the acorn nut covering the relief valve adjusting screw. Measure the distance of the relief valve adjusting screw to the pump surface and record its length. Finish disassembling the relief valve. Inspect the seat in the head and the poppet for signs of wear or foreign matter on either surface.

PUMP ASSEMBLY (SG-804 SERIES™, SG-805 SERIES™, SGN-805 SERIES™, SG-807 SERIES™, SGN-807 SERIES™)

- The pump is ready to be reassembled after all parts have been cleaned and worn parts replaced.
- Use a suitable lubricant compatible with the fluid being handled when reassembling the pump.
- Make sure all holes machined in the bracket are clean, and that the mating surfaces of each section are free of any dents or burrs. Make sure the hole in the end of the shaft is unrestricted.

1. Install the bracket O-ring. If it is encapsulated (purple or orange appearance) then follow the special instructions below.
 - Do not attempt to reuse this type of O-ring if it has been removed. Immerse a new O-ring in boiling water for a few minutes. Remove from water and stretch out in hands so it will fit onto the bracket hub without forcing over a sharp edge. When in place, run hot water over O-ring until it shrinks down tight into the hub O-ring groove. Dry the area with compressed air.
2. Place head down on a flat surface with the O-ring groove up, and place the O-ring into the groove. Install the alignment sleeves in proper holes by tapping with soft headed hammer.
3. Slide the next section onto the alignment sleeves, whether it is a separation plate or a casing, and install another O-ring. The pump may require more than one pair of alignment sleeves. Add additional pairs when necessary.
4. After the casing is installed, place the driver and driven gears and shaft into the proper positions. Refer to **“Figure 11” on page 6** and **“Figure 12” on page 6** for proper positioning of driver and driven shaft assemblies.
5. After installing the casing, there should be a short length of alignment sleeve projecting out to line up the bracket. Install the final O-ring between sections. Lubricate the gears and shafts, then slide the bracket into place. Turn the pump on its side and insert assembly capscrew. Tighten each capscrew until finger tight, then tighten with torque wrench as specified in **“Table 1” on page 7**.

TABLE 1

| Series | Bolt Size | Quantity | Torque Spec. (Ft-Lb) |
|----------------------------------|-----------|----------|----------------------|
| SG-804 Series™ SG-805 Series™ | 1/4 | 2 | 7 - 9 |
| SG-807 Series™ | 1/2 | 4 | 50 - 55 |

6. Reassemble the relief valve, setting the adjusting screw to the previous position. Place the gasket onto the adjusting screw. Hold the adjusting screw while tightening the locknut. Recheck the position of the adjusting screw. Install the second gasket on other side of the locknut and install the acorn nut.
7. Install the drive key into the drive shaft keyway and the inner retaining ring into the groove closest to the pump bracket.

NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

⚠ DANGER !

Follow these directions exactly to avoid injury to self or damage to the pumping unit. Be careful to keep the inner and outer magnets at least (1) foot apart until step 4. Do not engage the magnets in any other fashion.

MD-A & MD-B COUPLING ASSEMBLY

1. Inspect magnets for any metal objects that may be attached. Remove any foreign material. Locate the outer magnet assembly per drawing (See “Figure 10” on page 13). Apply Loctite® or equivalent to the set screw threads and tighten both setscrews on to the motor or bearing carrier shaft. The bearing carrier housing features a machined step on its mounting flange, which is the reference point for setting the position of the outer magnet.
2. Mount the bracket to the motor (or bearing carrier to footed bracket) and secure with 4 capscrews (See “Figure 9” on page 5). Reach in and rotate the outer magnet by hand to make sure there is no interference between outer magnet and motor. If rubbing occurs, check the A, B or C dimension. (See “Figure 10” on page 13).
3. With the key and inner retaining ring in place, slide the inner magnet assembly onto the pump shaft. Secure inner magnet assembly with second retaining ring. Rotate the pump shaft and magnet to make sure they turn freely. Inspect for any foreign particles which could damage the pump.

Check the bracket O-ring to make sure it is in good condition and installed properly in the pump bracket. Place the canister onto the pump and press on until the canister is in contact with the pump bracket (See “Figure 8” on page 5).

4. Remove any foreign particles from the outside of the canister, then slide the canister and pump into the coupling bracket (See “Figure 7” on page 5).

⚠ CAUTION !

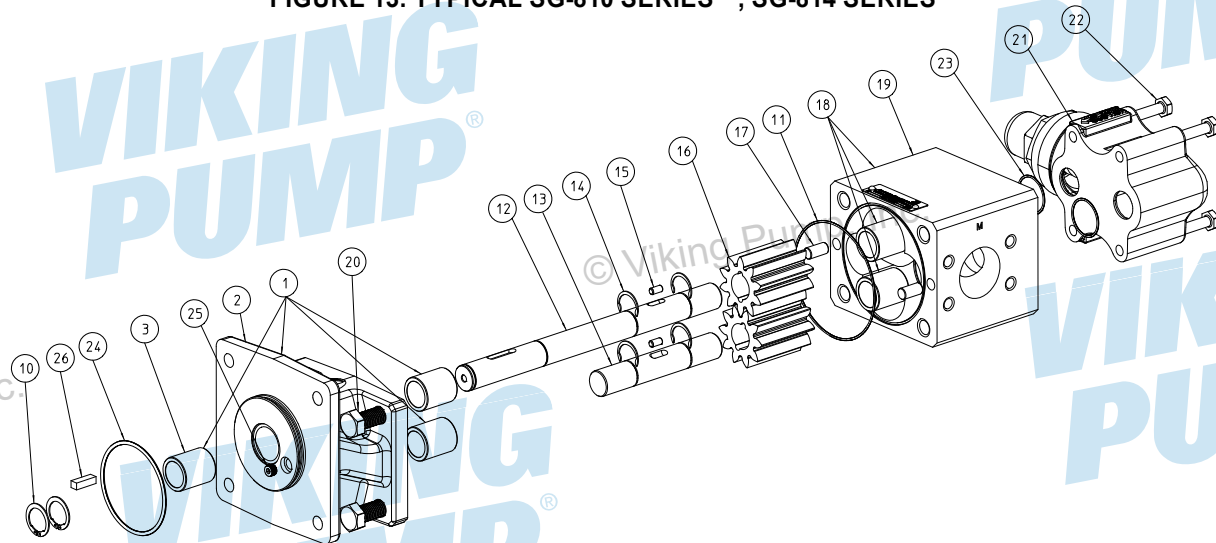
Do not place fingers near mounting surface to avoid pinching (See “Figure 6” on page 4).

5. Finish assembly by securing the pump to the bracket with bracket capscrews (See “Figure 6” on page 4). Torque bracket capscrews per “Table 2” on page 13. With power disconnected, check to see if the pump shaft rotates freely. This may be done by spinning the motor fan blades or bearing carrier shaft.

TABLE 2

| Series | Torque (Ft-Lb) | Torque (Nm) |
|----------------------------------|----------------|-------------|
| SG-804 Series™ SG-805 Series™ | 12 - 15 | 16 - 20 |
| SG-807 Series™ | 31 - 34 | 42 - 46 |

FIGURE 13: TYPICAL SG-810 SERIES™, SG-814 SERIES™



| Item | Name Of Part | Item | Name Of Part | Item | Name Of Part |
|------|---------------------------------------|------|----------------------------------|------|---------------------------------|
| 1 | Bracket & Bushing Assembly | 14 | Crescent Snap Rings (4 Required) | 21 | Relief Valve Assembly |
| 2 | Bracket | 15 | Gear Pins (2 Required) | 22 | Mounting Capscrews (4 Required) |
| 3 | Bushings (3 Required) | 16 | Gears (2 Required) | 23 | O-Ring for Relief Valve |
| 10 | External Retaining Rings (2 Required) | 17 | Alignment Pins (2 Required) | 24 | O-Ring for Canister |
| 11 | O-ring for Casing | 18 | Casing & Bushing Assembly | 25 | Orifice |
| 12 | Drive Shaft | 19 | Casing | 26 | Key for Inner Magnet |
| 13 | Driven Shaft | 20 | Capscrews (4 Required) | | |

NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

MD2-B & MD2-C COUPLING PUMP REMOVAL

⚠ CAUTION !

Use extreme caution when pulling the inner magnet away from the outer magnet (see "Figure 15" on page 9). Do not place your fingers between the pump mounting flange and the face of the bracket. If you do not completely pull the pump out it will snap back, and could pinch a finger or hand. Once the inner magnet is removed from the bracket, it will attract any iron or steel object. Use caution in setting it down.

FIGURE 14

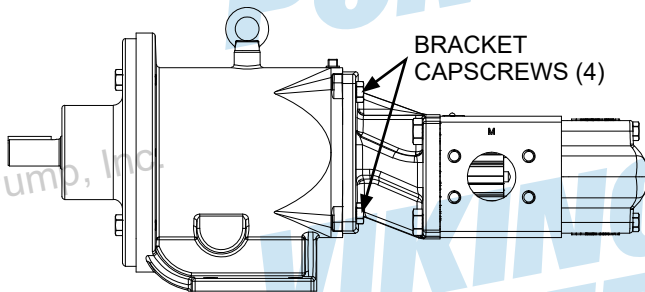
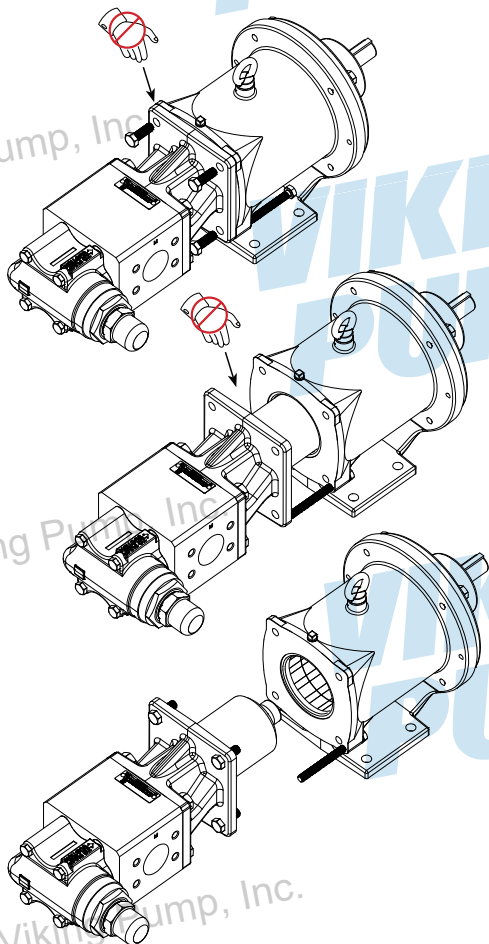


FIGURE 15:
PUMP & BRACKET SEPARATION SEQUENCE



Read all of the instructions before proceeding with disassembly of the coupling and/or pump.

1. Remove the piping to the ports and remove the capscrews securing the pump to the bracket (See "Figure 14" on page 9). Support the pump with an overhead hoist if possible. Use the M10 x 120 capscrew (jackscrew) in the bracket to separate the inner magnet from the outer. (See "Figure 15" on page 9).
2. Pull the pump straight off. The canister will contain some liquid, so use care while removing the pump (See "Figure 16" on page 9).
3. Remove the external snap ring (closest to the end of the pump shaft), and slide off the inner magnet assembly (See "Figure 17" on page 9). Use caution, the magnet is very strong.
4. Do not remove the bracket O-ring unless it is damaged, especially if it is PTFE (Derivative) Encapsulated. If a new O-ring is required, refer to "Pump Assembly (SG-804 Series™, SG-805 Series™, SGN-805 Series™, SG-807 Series™, SGN-807 Series™)" on page 7 or "Pump Assembly (SG-810 Series™, SG-814 Series™)" on page 11.
5. The outer magnets can be visually inspected from the end of the bracket. If removal of the outer magnets is necessary, start by removing the (4) cap screws, and separating the bracket from the motor or bearing carrier (See "Figure 9" on page 5). Loosen setscrews in the outer magnet assembly to pull assembly off the shaft.

FIGURE 16: CANISTER REMOVAL

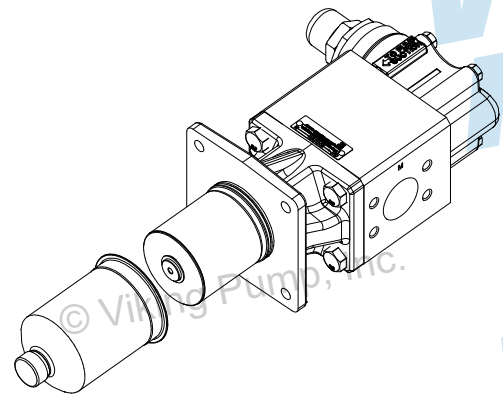
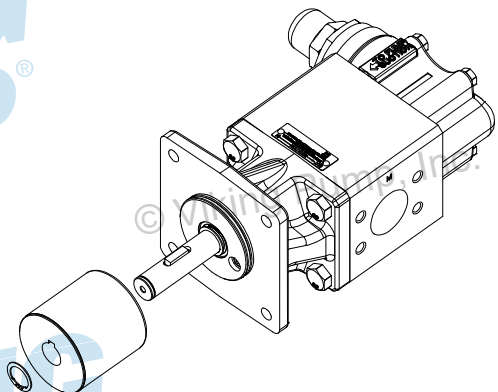
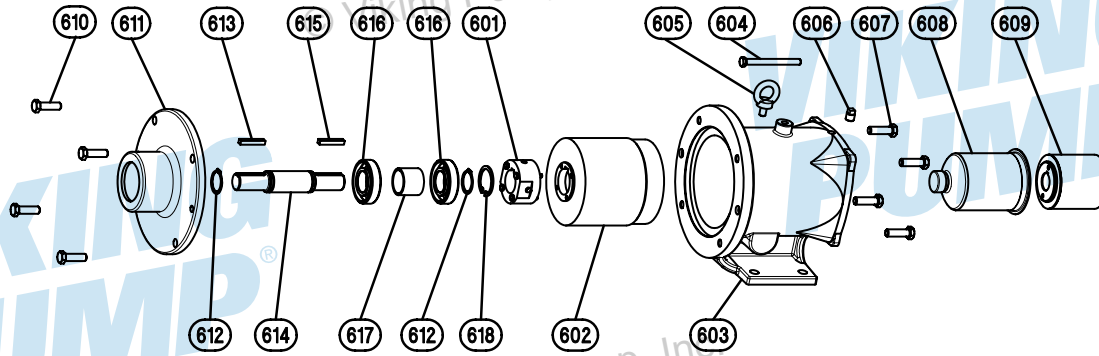


FIGURE 17: INNER MAGNET REMOVAL



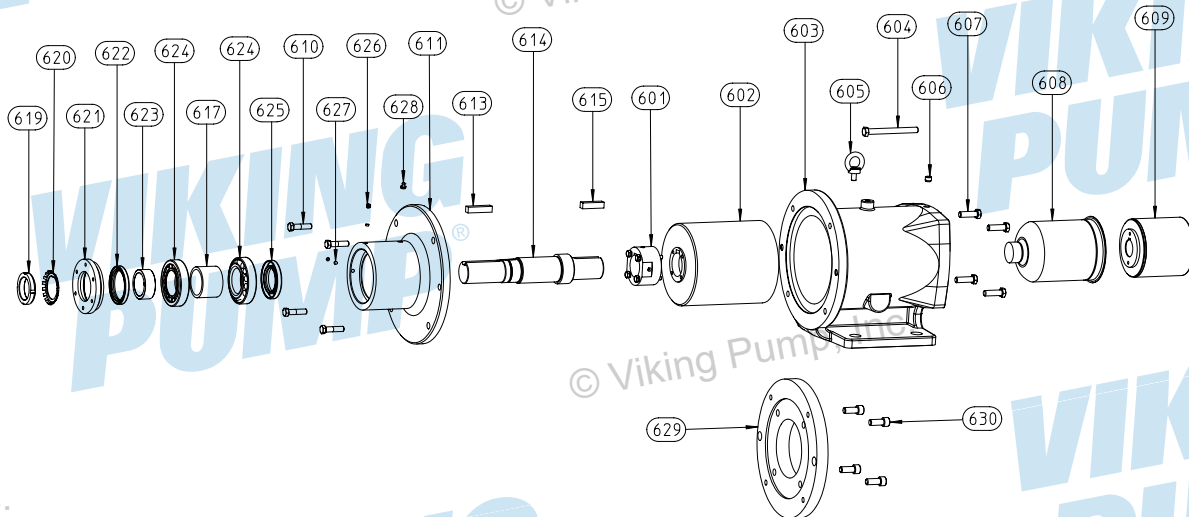
NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

FIGURE 18: TYPICAL SG-810 SERIES™, SG-814 SERIES™ M-DRIVE CONFIGURATION MD2-B SERIES COUPLING & BEARING CARRIER COMPONENTS



| Item | Name Of Part | Item | Name Of Part | Item | Name Of Part |
|------|---|------|---|------|---------------------------|
| 601 | Bolt-on Hub with Hardware | 607 | Capscrews (metric) for Pump (4 Req'd) | 613 | Drive Key - Outboard Side |
| 602 | Outer Magnet Assembly | 608 | Canister and Bushing Assembly | 614 | Shaft |
| 603 | Bracket | 609 | Inner Magnet Assembly | 615 | Drive Key - Inboard Side |
| 604 | Capscrew (jackscrew) for Disassembly (metric) | 610 | Capscrews (metric) for Motor or Bearing Carrier (4 Req'd) | 616 | Ball Bearing (2 Req'd) |
| 605 | Lifting Eye | 611 | Bearing Carrier Housing | 617 | Spacer |
| 606 | Pipe Plug for Sensor Hole | 612 | External Retaining Ring (2 Req'd) | 618 | Internal Retaining Ring |

FIGURE 19: TYPICAL SG-810 SERIES™, SG-814 SERIES™ M-DRIVE CONFIGURATION MD2-B SERIES COUPLING & BEARING CARRIER COMPONENTS



| Item | Name Of Part | Item | Name Of Part | Item | Name Of Part |
|------|---|------|--|------|--|
| 601 | Bolt-on Hub with Hardware | 610 | Capscrews (metric) for Motor or Bearing Carrier (4 Req'd), 284 Motor Frame (5 Req'd) | 622 | Lip Seal (Outer) |
| 602 | Outer Magnet Assembly | 611 | Bearing Carrier Housing | 623 | Outer Bearing Spacer |
| 603 | Bracket | 613 | Drive Key (Outboard Side) | 624 | Tapered Roller Bearing (2 Req'd) |
| 604 | Capscrew (jackscrew) for Disassembly (metric) | 614 | Shaft | 625 | Lip Seal (Inner) |
| 605 | Lifting Eye | 615 | Drive Key (Inboard Side) | 626 | Setscrew (2 Req'd) |
| 606 | Pipe Plug for Sensor Hole | 617 | Inner Bearing Spacer | 627 | Insert (2 Req'd) |
| 607 | Capscrews (metric) for Pump (4 Req'd) | 619 | Locknut | 628 | Grease Fitting |
| 608 | Canister & Bushing Assembly | 620 | Lockwasher | 629 | Adapter (NEMA motor only) |
| 609 | Inner Magnet Assembly | 621 | End Cap | 630 | Capscrews (metric) for Adaptor (4 Req'd) |

NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) be sure:

1. That any pressure in the chamber has been completely vented through the suction or discharge lines, or other appropriate openings or connections.
2. That the driving means (motor, turbine, engine, etc.) has been “locked out” or made non-operational, so that it cannot be started while work is being done on pump.
3. That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.

Failure to follow above listed precautionary measures may result in serious injury or death.

PUMP DISASSEMBLY (SG-810 SERIES™, SG-814 SERIES™)

1. Mark the bracket and casing before disassembly to ensure proper reassembly. Remove bracket from pump casing.
2. Remove both shaft assemblies.
3. To remove the gears from the shafts, remove the snap rings. The gears should then slide freely off the shaft.
NOTE: There is a small pin located under the gear which can fall out of its groove when the gears are removed.
4. If the bearings or bushings need to be replaced: Remove the bearings from the bracket and casing using a Blind Bearing Puller. To remove carbon graphite or silicon carbide bushings, use a cold chisel or punch to break the bushing. Be careful not to damage the bore.

MD2-B COUPLING DISASSEMBLY

The bearing carrier for an MD2 B coupling features two sealed ball bearings along with the outer magnet assembly. If further disassembly of this unit is required, reference “**Figure 18**” on page 10, then proceed as follows:

1. Remove the internal retaining ring. Using a press, press the shaft out of the housing.
2. Remove the external retaining rings from shaft. Place the unit into the press and push the shaft out of the bearings.

MD2-C COUPLING DISASSEMBLY

The bearing carrier for the MD2-C coupling features two tapered roller bearings secured by a threaded end cap. The unit is greased externally using the grease fitting. If further disassembly is required, reference “**Figure 19**” on page 10, then proceed as follows:

1. Remove the two setscrews from the bolt-on hub and slide the outer magnet off of the shaft. Remove the outboard drive key in shaft.
2. Place the inboard side of the shaft in a vise with padded jaws. Bend the lockwasher tab up and gently tap the locknut in a counterclockwise direction. Remove the locknut and lockwasher.
3. Loosen the two setscrews retaining the end cap. Back out the end cap completely. Pull or gently tap the shaft out the back of the bearing housing. Be sure to keep the cup and cone of the outer bearing together. If either the cup or cone requires replacing, it is recommended to replace as a set. The inner cone will probably stay in the housing unless it is to be replaced.
4. One lip seal is pressed into the end cap and the other is pressed into the bearing housing. Do not remove the lipseals unless they require replacement. If removed, pay close attention to the orientation as shown in **Figure ??** when installing the new lip seals.

PUMP ASSEMBLY (SG-810 SERIES™, SG-814 SERIES™)

1. Clean the bracket and casing thoroughly. If the bearings were removed, install new pump bearings into each bore using an arbor press. If bushings are carbon graphite, Refer to “**Installation: Carbon Graphite Bushings**” on page 12.
2. Assemble the shaft / gear assemblies. Install one snap ring onto the shaft. Place the anti rotation pin into its groove on the shaft. Slide the gear over the pin and lock into place using the second snap ring. **NOTE:** Make sure the snap rings do not block the flow path along the gear ID.
3. Coat shaft / gear assemblies with light oil. Place both shafts in the casing with the drive shaft (longer shaft) on the top (nameplate side).
4. Lubricate the casing O-ring and place it in the groove.
5. Place the pump bracket onto the casing. Tighten the capscrews evenly.

DANGER !

Before starting pump, be sure all drive equipment guards are in place.

Failure to properly mount guards may result in serious injury or death.

INSTALLATION: CARBON GRAPHITE BUSHINGS

When installing carbon graphite bushings, extreme care must be taken to prevent breaking. Carbon graphite is a brittle material and easily cracked. If cracked, the bushing will quickly disintegrate. Using a lubricant and adding a chamfer on the bushing and the mating part will help in installation. The additional precautions listed below must be followed for proper installation.

1. A press must be used for installation.
2. Be certain bushing is started straight.
3. Do not stop pressing operation until bushing is in proper position. Starting and stopping will result in a cracked bushing.
4. Check bushing for cracks after installation.

! DANGER !

Follow these directions exactly to avoid injury to self or damage to the pumping unit. Be careful to keep the inner and outer magnets at least (1) foot apart until step 4. Do not engage the magnets in any other fashion.

! CAUTION !

Do not place fingers onto the front of pump mounting flange. Align the canister into bore of the bracket and gently slide it in. When the magnets start to engage, the unit will finish engagement on its own very rapidly, unless the M10x120mm capscrew is properly used. Make sure fingers are not on the front of the pump. See "Figure 16" on page 9.

! DANGER !

Be certain that the driving means (motor, turbine, engine, etc.) has been "locked out" or made non-operational, so that it cannot be started while work is being done on pump.

MD2-B & MD2-C COUPLING ASSEMBLY

1. Inspect the magnets for any steel objects, which may be attached. Remove any foreign material. If using bearing carrier assembly option, refer to "Figure 21" on page 13 for MD2-B or "Figure 22" on page 13 for MD2-C.

MD2-B Couplings:

Mount the outer magnet assembly. Locate the outer magnet assembly per dimension (See "Figure 20" on page 12).

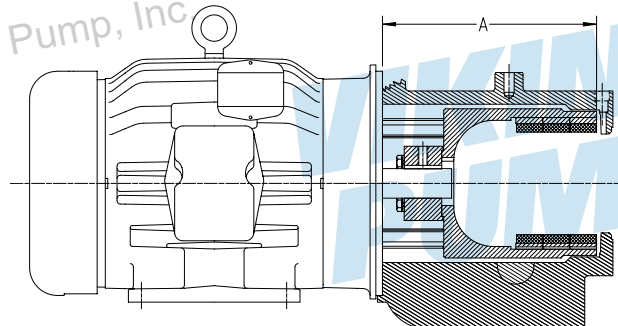
MD2-C Couplings:

Units using a NEMA C-face frame motor will require an adaptor plate. Mount the adaptor plate to the motor if it was removed. Mount the outer magnet assembly. Locate the outer magnet assembly per dimension (See "Figure 20" on page 12).

Apply Loctite® or equivalent and tighten the setscrews onto the motor or bearing carrier key and shaft.

2. If the bracket is not fastened to a base, clamp it down. Mount the motor or bearing carrier to the bracket. Reach in and rotate the magnets by hand to make sure there is no interference. If rubbing occurs check the dimension in "Figure 20" on page 12, or contact your Viking Pump® representative.

FIGURE 20:



MD2-B Magnets (Measured from the motor face - not pilot)

| Motor | "A" Dimension (Inch) | "A" Dimension (Metric) |
|----------------|----------------------|------------------------|
| I.E.C. 100/112 | 7.89 | 200.4 MM |
| I.E.C. 132 | 8.68 | 220.5 MM |
| 182TC/184TC | 8.11 | 206 MM |
| 213TC/215TC | 8.61* | 215.7 MM |
| 254TC/256TC | 9.11 | 231 MM |

Magnet mounting brackets sold prior to June 2014 for the 213TC/215TC motor frame sizes and bearing carrier have an "A" dimension of 8.49 inches.

MD2-C Magnets (IEC Measured from motor face, NEMA Measured from edge of adaptor plate)

| Motor | "A" Dimension (Inch) | "A" Dimension (Metric) |
|---------------|----------------------|------------------------|
| I.E.C.132 | 10.43 | 265 MM |
| I.E.C.160/180 | 11.61 | 295 MM |
| 213TC-256TC | 10.43 | 265 MM |
| 284/286TC | 10.43 | 265 MM |

3. Check to make sure the pump rotates freely by turning the inner magnet assembly. Inspect the magnet to make sure it has not picked up any foreign particles, which could damage the pump. Make sure the canister O-ring is in good condition and in place. Place the canister onto the pump and press on until the canister is in contact with the pump mounting flange.
4. Use a fully threaded M10X120mm capscrew (jackscrew) to guide the canister into the bracket. Thread the capscrew all the way into the bracket as shown in "Figure 15" on page 9. Use an overhead hoist to support the pump if possible while guiding the canister into the bracket opening. Carefully back out the capscrew while guiding the canister into the bracket. Secure the pump to the bracket with four 12mm capscrews.
5. Be certain that the power supply to the pump is shut off and mechanically prevented from being turned back on. Check that pump rotates freely by spinning the motor fan blades or the bearing carrier shaft.

FIGURE 21: MD2-B OUTER MAGNET, BOLT ON HUB AND BEARING CARRIER

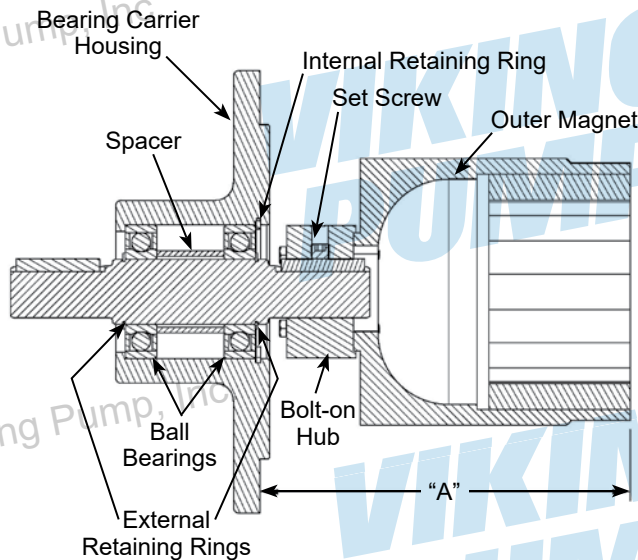
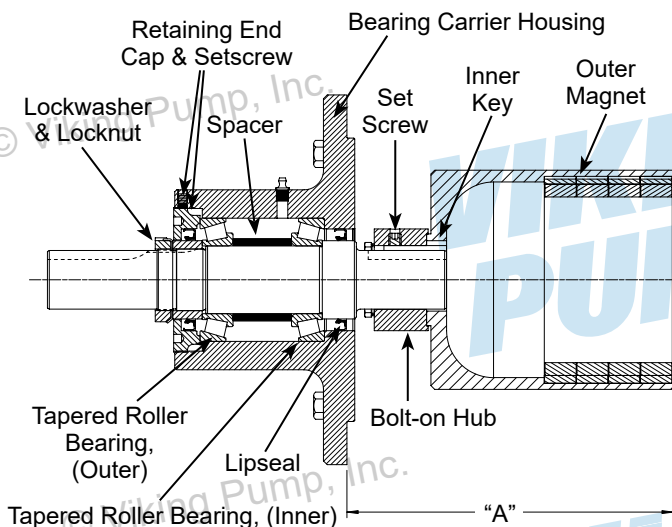


FIGURE 22: MD2-C OUTER MAGNET, BOLT ON HUB AND BEARING CARRIER



NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

MD2-B BEARING CARRIER ASSEMBLY

1. Place some Loctite® or equivalent on the O.D. of the first bearing, and press into the housing bore. Position the bearing spacer, in the bore and insert the second bearing. Center the bearing spacer then press in the shaft with one external retaining ring on the shaft. Press down until the ring contacts the bearing race, then install the second ring. Install the internal retaining ring into the bearing housing. See "Figure 21" on page 13.
2. Slide the outer magnet assembly onto the pump shaft. Locate the outer magnet per dimension "A" in "Table 3" on page 13, then tighten the two setscrews. See "Figure 21" on page 13.

TABLE 3: MD2-B COUPLING OUTER MAGNET LOCATION DIMENSION*

| Pump Design | "A" Dimension |
|------------------|---------------|
| U.S. Inch Design | 8.61** inches |
| Metric Design | 220.4 mm |

* Dimensions are not the same between designs

** Magnet mounting brackets sold prior to June 2014 for the 213TC/215TC motor frame sizes and bearing carrier have an "A" dimension of 8.49 inches.

MD2-C BEARING CARRIER ASSEMBLY

Depending on the condition of the bearings, either replace or repack existing bearings by cleaning and packing with multi-purpose NLGI #2 grease. Replace the lipseals if necessary. See "Figure 22" on page 13 for lipseal orientation.

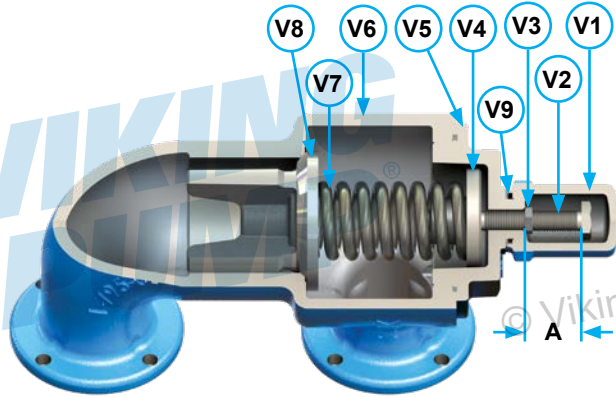
1. Place the bearing housing milled-face down with cast surface up. If the inner lip seal was removed, install with the cup up. Install the cup of inner bearing into housing (cup up).
2. Slide the inner tapered roller bearing cone onto the shaft (cone down) and then the inner spacer followed by the outer cone (cone up).
3. Guide shaft into the housing and into the inner lip seal. Slide the tapered roller bearing outer cup into the housing (cup down) and the bearing spacer collar onto shaft.
4. Thread in the end cap until it meets the outer cup. Install the lockwasher and locknut. Secure the end of the shaft in a vice with padded jaws then tighten the locknut. Tighten the end cap until there is considerable drag on the bearings, then back off the end cap approximately 10°. Secure the end cap into position by tightening the two set screws.
5. Tighten the locknut again, then bend over the appropriate lockwasher tab.
6. Install the inboard drive key, then slide the magnet onto the shaft. Locate the outer magnet per dimension "A" in "Table 4" on page 13. Tighten the two setscrews to lock into proper position. See "Figure 22" on page 13.

TABLE 4: MD2-C COUPLING OUTER MAGNET LOCATION DIMENSION

| Pump Design | "A" Dimension |
|------------------|---------------|
| U.S. Inch Design | 10.43 inches |
| Metric Design | 265 mm |

PRESSURE RELIEF VALVE INSTRUCTIONS

FIGURE 23: RELIEF VALVE
NOTE: Image is representative only.



Valve - List Of Parts

| | | | |
|-----|-----------------|-----|-----------------|
| V1. | Valve Cap | V6. | Valve Body |
| V2. | Adjusting Screw | V7. | Valve Spring(s) |
| V3. | Lock Nut | V8. | Poppet |
| V4. | Spring Guide | V9. | Cap Gasket |
| V5. | Bonnet | | |

⚠ DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) be sure:

1. That any pressure in the chamber has been completely vented through the suction or discharge lines, or other appropriate openings or connections.
2. That the driving means (motor, turbine, engine, etc.) has been “locked out” or made non-operational, so that it cannot be started while work is being done on pump.
3. That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.

Failure to follow above listed precautionary measures may result in serious injury or death.

DISASSEMBLY

Mark valve and head before disassembly to ensure proper reassembly.

1. Remove valve cap.
2. **SG-810 Series™, SG-814 Series™:** Measure and record length of extension of adjusting screw. Refer to “A” on “Figure 23” on page 14.
3. Loosen locknut and back out adjusting screw until spring pressure is released.
4. Remove bonnet, spring guide, spring and poppet from valve body. Clean and inspect all parts for wear or damage and replace if necessary.

NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

ASSEMBLY

Reverse procedures outlined under Disassembly. If valve is removed for repairs be sure to replace in same position. Relief valve adjusting screw cap must always point towards suction side of pump. If pump rotation is reversed, remove relief valve and turn end for end.

PRESSURE ADJUSTMENT

If a new spring is installed or if pressure setting of pressure relief valve is to be changed from that which the factory has set, the following instructions must be carefully followed.

1. Carefully remove valve cap which covers adjusting screw. Loosen locknut which locks adjusting screw, so pressure setting will not change during operation of pump.
2. Install a pressure gauge in the discharge line for adjusting the relief valve setting during operation.
3. Turn the adjusting screw CW (in) to increase the pressure setting, and CCW (out) to decrease the setting. For guidance dimensions, contact your Viking Pump® representative for Engineering Standard ES-37.
4. Close the discharge line at a point beyond the pressure gauge. Limit the amount of time the pump is operated at this condition. The temperature inside the pump will rise rapidly. The pressure gauge will show maximum pressure that valve will allow while pump is in operation.
5. Once the relief valve pressure is set, tighten locknut and replace the cap gasket and valve cap.

IMPORTANT ORDERING INFORMATION

In ordering parts for pressure relief valve, always give model number and serial number of pump as it appears on nameplate and name of part wanted. When ordering springs, be sure to give pressure setting desired.

APPENDIX (FORMERLY TSM 340)

NOTE: This Appendix section is for reference only. Not all pump construction features apply to pumps within this Technical Service Manual.

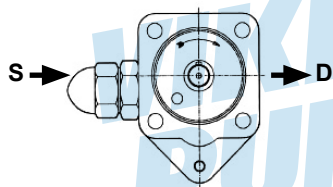
GENERAL INSTALLATION NOTES

The following items must be considered prior to pump installation:

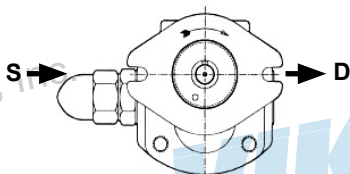
1. **Location** - locate the pump as close as possible to the liquid supply. If possible locate the pump below the liquid supply. Viking pumps are self-priming; but the better the suction conditions, the better the pump will perform.
2. **Accessibility** - the pump must be accessible for inspection, maintenance and repair.
3. **Suction/Discharge** - SG Series pumps are designed for clockwise rotation as standard (viewed from end of shaft). Refer to **Figure A1**.

**FIGURE A1: CLOCKWISE ROTATION
(VIEWED FROM SHAFT END)**

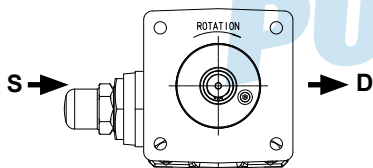
SG-04 Series™ & SG-05 Series™:



SG-07 Series™:



SG-10 Series™ & SG-14 Series™:



4. **Pressure Relief Valve** - the SG Series is a positive displacement pump and requires some form of over pressure protection. Without pressure protection, if the discharge line is blocked or becomes closed, pressure will build up until the motor stalls, drive equipment fails, a pump part breaks, or the piping and/or other equipment in the system bursts. To prevent the possibility of any one or more of the above from occurring, the use of a pressure relief valve is recommended.
5. **Storage** - drain the pump and apply a light coat of non-detergent SAE 30 weight oil to all internal pump parts. Apply grease to the pump shaft extension. Viking suggests rotating the pump shaft by hand one complete revolution every 30 days to circulate the oil.

ALIGNMENT

Check alignment after mounting.

1. If the unit has a flexible coupling, remove any coupling guards or covers and check the alignment of coupling halves. A straight edge (piece of key stock will work) across the coupling must rest evenly on both rims at the top, bottom and sides. See **Figure A2**.

FIGURE A2

Use a straightedge. These surfaces must be parallel.



Check width between these surfaces with inside calipers to be certain the faces are equal distance apart and parallel.

2. Make a final check on alignment after piping is hooked up.

PIPING/HOSE

The cause of many pumping problems can be traced to the suction piping. It should always be as large in diameter, and as short in length, as possible.

Before starting the layout and installation of your piping system, consider the following points:

1. Never use piping smaller than the pump port connections. Piping larger in diameter than the port connection is sometimes required to reduce friction losses.
2. Be sure the inside of the pipe is clean before installing.
3. When approaching an obstacle to the suction line, go around instead of over it. Going over an obstacle can create an air pocket. Where practical, slope the piping so no air or liquid pockets will be formed. Air pockets in the suction line make it hard for the pump to prime.
4. A strainer on the suction side of the pump should always be considered in any pumping system. The strainer will keep foreign matter from entering the pump. The strainer mesh or perforation size should be large enough so that it does not cause excessive pressure drop, but fine enough to protect the pump. Use of a strainer is particularly important at start up to help clean the system of weld beads, pipe scale and other foreign objects.
5. A pressure relief valve is required in the discharge line. See "**Pressure Relief Valve**" under "**General Installation Notes**" item 4.
6. The pump must not be used to support the piping. Hangers, supports, stands, etc. must carry the weight of the pipes.
7. When fastening piping to the pump do not impose any strain on the pump casing. "Springing" or "drawing" the piping up to the pump will cause distortion, possible misalignment and probable rapid wear of the pump. Do not use the pump to correct errors in piping layout or assembly.

NOTE: SG-804 Series™, SG-810 Series™ & SG-814 Series™ Pumps Discontinued as of 4Q20. SGN-805 Series™ & SGN-807 Series™ Discontinued as of 4Q22.

8. All joints of piping system must be tight; liquid thread sealant will help assure leak free threaded joints. Loose joints result in liquid leaks or suction side leaks. Leaks in the suction line can permit air to be drawn in, and will cause a noisy pump and reduction in capacity. **CAUTION: Be careful not to over tighten fittings as this can cause cracked ports.** Do not use PTFE tape. Reduced friction makes over tightening very easy, and will result in cracked ports.
9. Drive alignment must be checked after piping is connected.
10. Provide a pressure relief device in any part of a pump and piping system that can be isolated by closing a valve. Isolating a part of the system with a pump can cause a rise in liquid temperature, which causes the liquid to expand. Without overpressure protection, it is possible for the pump or piping to rupture.

⚠ DANGER !

Before starting the pump, be sure all drive equipment guards are in place. Failure to properly mount guards may result in serious injury or death.

START UP

Before starting the pump unit, check the following:

1. Ensure vacuum and pressure gauges (liquid filled) are mounted on or near the pump. Gauges are the quickest and most accurate way of finding out what is happening in the pump.
2. Check the pump and drive alignment.
3. Make sure there is no pipe strain on the pump ports.
4. Rotate the pump shaft by hand to be sure it turns freely.
5. Before connecting to the motor, jog it to be sure it is running in the correct direction. Refer to “**General Installation Notes**”.
6. Ensure the pressure relief valve is installed properly.
7. Make sure the suction piping is properly connected and sealed, and that the valves are open.
8. Make sure the discharge piping is properly connected and sealed, the valves are open, and that there is a place for the liquid to go.
9. Make sure all guards are in place.
10. The above checklist is a general guideline to be used prior to starting the pump. Since Viking Pump® cannot foresee every application for our product and possible system design, the final responsibility is with the user. The pump must be utilized within the catalog specifications and the pump system must be designed to provide safe working conditions.

The pump unit may now be started. The pump should begin to deliver liquid within 15 seconds. If not, stop the pump unit. Do not run the pump without liquid flow longer than 30 seconds or the pump may be damaged. Review “**Start Up**” steps 1 through 10. Consider what the suction and discharge gauges may indicate. If everything appears in order, re-prime pump. Refer to “**Mounting**” item 8.

Re-start the pump. If nothing is flowing within 30 seconds, stop the pump. It may be necessary to vent discharge line until liquid begins to flow.

If pump still does not deliver flow, consider one or more of the following:

1. The suction line has air leaks.
2. The end of the suction pipe is not submerged deeply enough in the liquid.
3. The suction lift is too great, or the suction piping is too small.
4. Liquid is vaporizing in the suction line before it gets to the pump.

If the pump does not deliver liquid after considering these points, review all points under “**Start Up**,” read through the “**Troubleshooting**” guide, and try starting the pump again. If pump still will not deliver liquid, contact your Viking Pump® representative.

TROUBLESHOOTING

A Viking pump that is properly installed and maintained will give long and satisfactory performance. If trouble develops, installing a vacuum gauge on the suction port, and a pressure gauge on the discharge port, will help determine what is occurring. The gauges will assist in determining where to begin investigating.

VACUUM GAUGE - SUCTION PORT

1. High reading would indicate:

- a. The suction line is blocked or pinched, a valve is closed, or a strainer is plugged.
- b. The suction line is too small.
- c. The liquid is too viscous to flow through the piping.
- d. The lift required is too high.

2. Low reading would indicate:

- a. Air leak in the suction line.
- b. The end of the suction pipe is not in the liquid.
- c. Pump is worn.
- d. Pump is dry, - should be primed.

3. Fluttering, jumping, or erratic reading:

- a. The liquid is vaporizing.
- b. The liquid is entering the pump in chunks.
- c. There is an air leak, or insufficient liquid head above the end of the suction pipe.
- d. Vibration from cavitation, misalignment, or damaged parts.

PRESSURE GAUGE - DISCHARGE PORT

1. High reading would indicate:

- a. High viscosity and small and/or long discharge line.
- b. The strainer or filter is plugged.
- c. The pressure relief valve is set too high.
- d. A valve in the discharge line is partially closed.
- e. The line is partially plugged from buildup on the inside of the pipe, solidified product, or a foreign object.
- f. Liquid in the pipe is not up to temperature.

2. Low reading would indicate:

- a. The relief valve is set too low.
- b. The relief valve poppet is not seating properly.
- c. Pump mounting capscrews not torqued to specifications (GP-04 and GP-05 Series 12-15 ft.-lbs.).
- d. Pump assembly bolts not torqued into specifications (GP-07 Series 50-55 ft.- lbs.).
- e. The bypass around pump partially open.
- f. Pump is damaged or worn.
- g. The pump has too much internal clearance.

3. Fluttering, jumping, or erratic reading:

- a. Cavitation.
- b. Liquid is entering the pump in chunks.
- c. Air leak in the suction line.
- d. Vibration from misalignment or mechanical problems.

Some of the following may also help pinpoint the problem:

1. Pump does not pump.

- a. Pump has lost its prime due to an air leak or low level in tank.
- b. Suction lift is too high.
- c. Rotating in wrong direction.
- d. The motor does not come up to speed.
- e. The strainer is clogged.
- f. Bypass valve open, relief valve set too low, relief valve poppet stuck open.
- g. The pump is worn out.
- h. Any changes in the liquid system or operation that would help explain the trouble, e.g. new source of supply, added more lines, inexperienced operators, etc.
- i. **Mag Drive pumps ONLY:** The magnetic coupling is decoupling. Changes in application (temperature, pressure, viscosity, etc.) may require torque beyond coupling capabilities.

2. Pump starts, then loses its prime.

- a. The supply tank is empty.
- b. Liquid is vaporizing in the suction line.
- c. There are air leaks, or air pockets in the suction line.
- d. The pump is worn out.

3. Pump is noisy.

- a. The pump is cavitating (liquid vaporizing in suction line) or being starved (heavy liquid cannot get to pump fast enough). Increase the suction pipe size, and/or reduce the length, or decrease the pump speed. If the pump is above the liquid, raise the liquid level closer to the center line of the inlet port. If the liquid is above the pump, increase the head of the liquid.
- b. Check alignment.
- c. Anchor the base or piping to eliminate vibration.

4. Pump not delivering up to capacity.

- a. Pump is starving or cavitating. See 3. **Pump is noisy**, item 1.
- b. Strainer partially clogged.
- c. There is an air leak in the suction line.
- d. The pump is running too slowly. Check the motor speed and wiring.
- e. Pressure relief valve is set too low, stuck open or has a damaged poppet seat.
- f. The bypass line around the pump partially opened.
- g. The pump is worn out.

5. Pump takes too much power (stalls motor).

- a. The pump sequence valve set too high.
- b. Liquid is more viscous than the unit is sized to handle.
- c. The system pressure relief valve set too high.
- d. The pump is misaligned.

DO'S & DON'TS

Do's and Don'ts for installation, operation, and maintenance of Viking pumps to assure safe, long, trouble-free operation.

INSTALLATION

1. **DO** install the pump as close as possible to the supply tank.
2. **DO** leave working space around the pumping unit.
3. **DO** use large, short, and straight suction piping.
4. **DO** install a strainer in the suction line.
5. **DO** double check alignment after the unit is mounted and piping is hooked up.
6. **DO** provide a pressure relief valve for the discharge side of the pump.
7. **DO** check for proper rotation.
8. **DO** use a return line filter.
9. **DO** use an industrial grade hydraulic oil.
10. **DO** use piping, hose and fittings rated for maximum system pressure.

OPERATION

1. **DON'T** run the pump at speeds faster than maximum catalog ratings for each model.
2. **DON'T** allow the pump to develop pressure higher than maximum catalog ratings for each model.
3. **DON'T** operate pumps at temperatures above or below maximum catalog ratings for each model.
4. **DON'T** operate unit without all guards in place.
5. **DON'T** operate the pump without a pressure relief valve in the discharge piping. Be sure the valve is mounted and set correctly.
6. **DON'T** stick fingers in ports of pump. Fingers may be pinched between gears.
7. **DON'T** work on the pump unless driver has been "locked out" so it cannot be started while work is being done on the pump.

TECHNICAL SERVICE MANUAL: INSTALLATION, OPERATION & MAINTENANCE**VIKING
PUMP®**

MOTOR SPEED PRODUCT LINE: **DUCTILE IRON**
SG-804 SERIES™, SG-805 SERIES™, SGN-805 SERIES™,
SG-807 SERIES™, SGN-807 SERIES™,
SG-810 SERIES™, SG-814 SERIES™

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MAINTENANCE

- DO** record pump model number and serial number, and file for further use.
- DO** have spare parts, pump or standby units available, particularly if pump is an essential part of a key operation process.
- DO** obtain, read and keep all maintenance instructions furnished with the pump.
- DO** make sure any pump that has residual system pressure in it, or that has handled high vapor pressure liquids, has been vented through the suction or discharge lines, or other openings provided for this purpose.
- DO** make sure that if the pump is still connected to the driver while maintenance is being performed, that the driver has been "locked out." This will prevent the driver from being started during pump maintenance.
- DO** make sure any pump that has handled a corrosive, flammable, hot or toxic liquid has been drained, flushed, vented and/or cooled before it is disassembled.


CAUTION !
TO REDUCE THE RISK OF LEAKAGE WITH VIKING MAG DRIVE PUMPS, USERS SHOULD COMPLY WITH THE FOLLOWING GUIDELINES AND ADHERE TO THE FOLLOWING PROCEDURES:

- The pump configuration and materials used in a pump are tailored to the application for which it is ordered. Users should never use a pump for an application that is different from the application specified when the pump was ordered. This includes differences in liquid, speed, pressure, temperature or viscosity.
- Users must understand the characteristics of liquids they are pumping, and be especially aware of any particulates in the liquid. Particulates can cause rapid wear of the bushings, especially if carbon graphite bushings are used. Hard bushings and hard shafts can reduce the risk of rapid wear, but the use of hard materials is not always the optimal solution. In applications involving non-abrasive, non-self lubricating liquids, carbon graphite bushings are typically the preferred material.
- Users should periodically inspect their pump for wear. This is especially critical and should be carried out with greater frequency when carbon graphite bushings are used, or the same pump has not previously been used for the same application, including the same liquid, speed, pressure, temperature and viscosity. Users should promptly replace worn parts when they are discovered.
- Users should continuously monitor pumps that are handling hazardous liquids. This is especially critical for unmanned, remote locations. If a user does not have in-house expertise in the area of monitoring, it should contact a local engineering firm with monitoring experience.

VIKING PUMP®**WARRANTY**

Viking pumps, strainers and reducers are warranted to be free of defects in material and workmanship under normal conditions of use and service. The warranty period varies by type of product. A Viking product that fails during its warranty period under normal conditions of use and service due to a defect in material or workmanship will be repaired or replaced by Viking. At Viking's sole option, Viking may refund (in cash or by credit) the purchase price paid to it for a Viking product (less a reasonable allowance for the period of use) in lieu of repair or replacement of such Viking product. Viking's warranty is subject to certain restrictions, limitations, exclusions and exceptions. A complete copy of Viking's warranty, including warranty periods and applicable restrictions, limitations, exclusions and exceptions, is posted on Viking's website (www.vikingpump.com/warranty#information). A complete copy of the warranty may also be obtained by contacting Viking through regular mail at Viking Pump, Inc., 406 State Street, Cedar Falls, Iowa 50613, USA.

THIS WARRANTY IS AND SHALL BE VIKING'S SOLE AND EXCLUSIVE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT, ALL OF WHICH OTHER WARRANTIES ARE EXPRESSLY EXCLUDED.

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UNDER NO CIRCUMSTANCES SHALL VIKING BE LIABLE UNDER THIS WARRANTY OR OTHERWISE FOR SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, LOST OR UNREALIZED SALES, REVENUES, PROFITS, INCOME, COST SAVINGS OR BUSINESS, LOST OR UNREALIZED CONTRACTS, LOSS OF GOODWILL, DAMAGE TO REPUTATION, LOSS OF PROPERTY, LOSS OF INFORMATION OR DATA, LOSS OF PRODUCTION, DOWNTIME, OR INCREASED COSTS, IN CONNECTION WITH ANY PRODUCT, EVEN IF VIKING HAS BEEN ADVISED OR PLACED ON NOTICE OF THE POSSIBILITY OF SUCH DAMAGES AND NOTWITHSTANDING THE FAILURE OF ANY ESSENTIAL PURPOSE OF ANY PRODUCT.