Graymills

Multi-Stage Centrifugal MSPR Pumps

Operations and Maintenance Instructions

WARNINGS/CAUTIONS

Read all these SAFETY INSTRUCTIONS BEFORE installing or using this equipment. Keep this manual handy for reference/training.

- Inspect unit for damage. Report any damage to carrier/dealer immediately.
- Pump may be heavy. If in doubt, take appropriate precautions.
- Motor must be grounded and suitable for the environment in which it is used. Do not use where explosion-proof motors are required.
- Do not allow liquids to come into contact with the motor, or any electrical components.
- Never attempt any service work while the unit is still connected to any electrical power source.
- This pump contains rotating parts. Use caution.
- When working on or around pump, be aware of what liquid is/has been pumped. If liquid is potentially harmful, take appropriate precautions.
- Never use any part of the wiring/electrical system to lift or move the equipment. This could cause a failure of the electrical system, resulting in severe shock or death.
- Do not operate this pump or allow others to operate it until the instructions and warnings have been read and are understood by all involved.

Never work with equipment you feel may be unsafe. Contact your Supervisor immediately.

DESCRIPTION/SPECIFICATIONS

The Graymills MSPR Series pumps are multi-stage centrifugal pumps designed to handle water-based coolants and water.

- Maximum liquid temperature 160°F (72°C).
- Maximum viscosity 300 SSU.
- Maximum suction pressure 75psi.
- Pipe connections are 1" NPT suction and discharge. 1/4" NPT Bypass is included.
- Rotation: left hand, ie, COUNTERCLOCKWISE when viewed from motor end.

POWER SUPPLY, WIRING AND GROUNDING

⚠ WARNING

Install ground and wiring according to local and National Electrical Code requirements.

- **Install a disconnect switch on all power legs near the pump.**
- **Disconnect and lockout electrical supply before installing or servicing pump.**
- 230/460V, 3 phase, 60 cycle AC circuit rated for a minimum of 10 amps. Refer to motor nameplate for instructions.
- Electrical supply MUST match pump's name plate specifications. Incorrect voltage can cause fire and/or damage to the motor and voids warranty.
- All three phase motors not protected for overload conditions MUST be provided with a starter which includes heaters.
- Use only stranded copper wire to motor and ground. The ground wire MUST be at least as large as the wire to the motor. Wires should be color coded for ease of maintenance.
- Follow motor manufacturer's wiring diagram on the motor nameplate or terminal cover carefully.

⚠ WARNING

Failure to permanently ground the pump, motor and controls before connecting to electrical power can cause shock, burns or death.

ROTATION

NOTICE: Incorrect rotation may cause damage to pump in as little as 5 seconds and will void the warranty.

- Correct rotation is left-hand, COUNTERCLOCKWISE when viewed from the motor end.
- Rotation can be verified by quickly energizing the pump for an **INSTANT** with a quick on/off motion.
- To reverse three phase motor rotation interchange any two power supply leads.

PIPING

- Piping should be no smaller than the pump discharge. Piping should be kept as short as possible, avoiding unnecessary fittings to minimize friction losses.
- All piping MUST be independently supported and MUST NOT place any piping loads on the pump. It should "line up" naturally.
- All joints MUST be airtight. Use 3 - 4 wraps of Teflon™ tape to seal threaded connections.

⚠ CAUTION

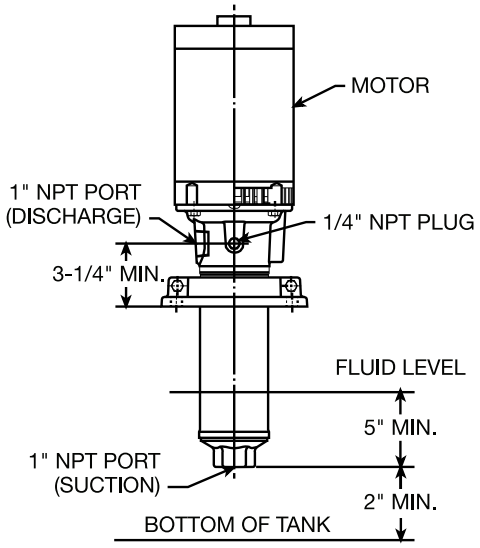
Never draw piping into place by forcing the pump discharge connections.

INSTALLATION

⚠ WARNING

Multi-stage pumps produce considerable shut-off pressure. Hoses and associated plumbing used with these pumps should be rated for a minimum working pressure of 180 psi. Failure to heed this warning could result in ruptured lines and possible injury to personnel.

Figure 1



- Maximum operating pressure: 175psig at 200°F
- Minimum and maximum liquid levels must be maintained for proper pump operation. See Figure 1.
- Allow adequate space for servicing and ventilation. Protect from freezing and flooding.

⚠ WARNING

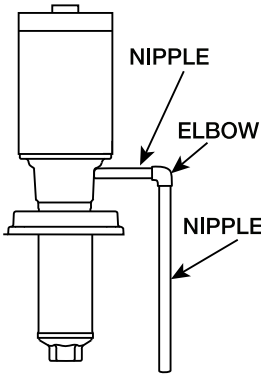
- **Use clean fluids only; no chips, grit or other foreign particles.**
- **Graymills recommends the use of an inlet strainer to minimize the size and amount of debris that enters the pump. Contamination drawn into the pump can cause internal damage and is not covered under warranty. Consult factory for recommendations as to the appropriate size and type of strainer to use.**
- High Pressure Filters for keeping fluid clean must be used. Graymills can provide the filter to trap particles, scale and contaminants to prevent costly damage. Filter collects up to 20 cu. in. of material (**HPFB20**) without pressure drop. Available in 14" length single cartridge model (**HPFB10**) or 24" length dual cartridge model (**HPFB20**). All models are 304 stainless steel for use with water-soluble and corrosive liquids. Reusable stainless steel cartridges available in 10, 50, and 100 mesh.

OPERATION

⚠ CAUTION

- **Before starting, pump must be primed (free of air) and discharge valves partially open.**
- **Do not run pump dry; damage to mechanical seal will result.**
- **Use a Check valve on plumbing if pump is mounted horizontally or if the potential to lose prime can occur.**
- **Do not run against closed nozzles or damage to pump and piping will result. Use Bypass as described below.**
- **Do not operate at or near zero flow.**
- If operating at or below 8 GPM or where valves may be opened and closed periodically, **you must use a bypass**. This kit (Bypass Kit C-32450) installs in the side of the discharge head and provides a fluid bypass when the pump is operated against a closed discharge thus preventing excessive heat build-up which will damage the pump.
- After stabilizing the system at normal operating conditions, check the piping. If necessary, adjust the pipe supports.

Bypass Kit Diagram



- To ensure proper suction, fluid level should cover first two impellers (5" from the suction end of the pump).
- Pump may be mounted horizontally with included horizontal mounting bracket.
- If pump is not generating enough pressure or flow, see "TROUBLESHOOTING GUIDE".

MAINTENANCE

⚠ WARNING

Failure to disconnect and lockout electrical power before attempting any maintenance can cause shock, burns or death.

- Motors have permanently lubricated bearings. No lubrication is possible or necessary. Follow the motor manufacturer's recommendations for maintenance.
- To REMOVE pump from service, drain all fluid from pump and piping.

- To RETURN pump to service, replace all plugs and piping using Teflon™ tape or equivalent on male threads.
- Refer to "OPERATION" section of manual.

DISASSEMBLY

See Figure 2 for Reference Numbers.

- Place wrenches on adapter (16) and suction head (1), and unscrew discharge head and casing (3).

NOTICE: Casing has a left hand thread on both ends and is sealed with o-rings (2).

- Remove clip ring (8) from end of shaft (13). The stages, each comprising a bowl (9), impeller (10) and diffuser (11) may now be removed. If pump has been clogged by foreign matter, but otherwise undamaged, further dismantling may be unnecessary. If shaft assembly (13), shaft seal (15) or motor are to be replaced proceed as follows:
- Remove plug from rear of motor and hold motor shaft with screwdriver. Unscrew pump shaft coupling assembly (13) from motor shaft. **This is a left hand thread.** Remove four motor mounting bolts (17), separate the motor from frame by withdrawing it straight back.
- Motor may have to be pried with two screwdrivers if the shaft seal sticks. The shaft seal stationary seat may be pushed out of adapter from the motor side. There is a rubber coupling o-ring (19) between motor shaft and coupling which will usually remain on the motor shaft as the seal is pulled over it.

REASSEMBLY

- Clean all parts, especially pump and motor register fits, and the seal seat counterbore in frame.
- Clean casing, pump coupling and motor shaft threads being sure to remove all the remaining locking compound. A wire brush is an efficient tool for this task.
- Lubricate counterbore of frame and rubber cup of new mechanical seal stationary face (white ceramic) with soapy water and press into counterbore squarely and evenly.

⚠ WARNING

Do not mar or contaminate the lapped face of the seal (face <u>without</u> groove).

- Check that the slinger (20) and the coupling o-ring (19) are on the motor shaft. If they are worn or damaged, replace. Install stationary face in motor adapter (16) and mount motor adapter (16) to motor. Install seal rotating element, making sure faces are clean and that the last rubber member goes over the coupling o-ring and onto the motor shaft. Screw the pump shaft and coupling assembly (13) on until it seats up against the motor shaft. **This is a left hand thread.** Place 2 or 3 shims on top of coupling to start with, then place diffuser (11), impeller (10) and bowl (9) over shaft. With a feeler gage check the gap between the face of the impeller and the stainless bowl. This gap should be maintained at .020 - .030". Check this gap as stages are added. After all stages are on the shaft, add shims over shaft until clip ring (8) can be inserted tightly into groove.

NOTICE: A stage is made up of the stainless steel bowl, impeller and diffuser which can be assembled prior to inserting them on the pump shaft.

- Check o-ring on both motor adapter (16) and suction head (1) and replace if damaged. Install and screw on casing (3). Note casing is a left hand thread. Thread on suction head (1). **This is a left hand thread.** Torque to 70 ft-lbs.
- With screwdriver in the slotted end of the pump shaft, turn the unit over before replacing plug. It should turn with no resistance except that of the shaft seal.

TROUBLESHOOTING

Problem	Probable Cause
Motor not running	Open circuit breaker or blown fuse. Impeller binding. Motor improperly wired. Defective motor.
Pump not generating enough pressure	Incorrect rotation. Intake port plugged or too close to bottom of tank. Improper piping installed with unnecessary fittings and decreases in diameter. Low fluid level.
Excessive power consumption	Impeller binding. Excessive flow rate. Fluid viscosity and/or specific gravity too high.
Little or no liquid delivered	Liquid in tank below suction. Pump is not primed; air or gases in fluid. Discharge, suction plugged or valve closed. Incorrect rotation. Low voltage or phase loss. Impeller worn or plugged with debris. System head too high.
Excessive noise and vibration	Impeller binding. Pump is not primed, air or gases in fluid. Discharge, suction plugged or valve closed. Impeller worn or plugged with debris. Excessive flow rate. Worn bearing. Pump, motor or piping loose.

WARRANTY

Graymills Corporation warrants that the equipment manufactured and delivered, when properly installed and maintained, shall be free from defects in workmanship and will function as quoted in the published specification. **Graymills** does not warrant process performance, nor assume any liability for equipment selection, adaptation, or installation.

Warranty does not apply to damages or defects caused by shipping, operator carelessness, mis-use, improper application or installation, abnormal use, use of add-on parts or equipment which damages or impairs the proper function of the unit, and modifications made to the unit. Warranty does not apply to expendable parts needing replacement periodically due to normal wear and tear.

A new Warranty period shall not be established for repaired or replaced materials or products. Such items shall remain under Warranty for only the remainder of the Warranty period of the original materials or product.

THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, WHETHER ORAL, WRITTEN, EXPRESSED, IMPLIED OR STATUTORY. **GRAYMILLS CORPORATION** MAKES NO OTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE AFORESTATED OBLIGATION ARE HEREBY DISCLAIMED BY **GRAYMILLS CORPORATION** AND EXCLUDED FROM THIS SALE. **Graymills** warranty obligations and Buyer remedies (except to title) are solely and exclusively stated herein. In no case will **Graymills** be liable for consequential damages. loss of production, or any other loss incurred due to interruption of service.

Graymills' obligation under this Warranty shall be limited to:

a) Repairing or replacing (at **Graymills** sole discretion) any non-conforming or defective component within one year from the date of shipment from **Graymills**.

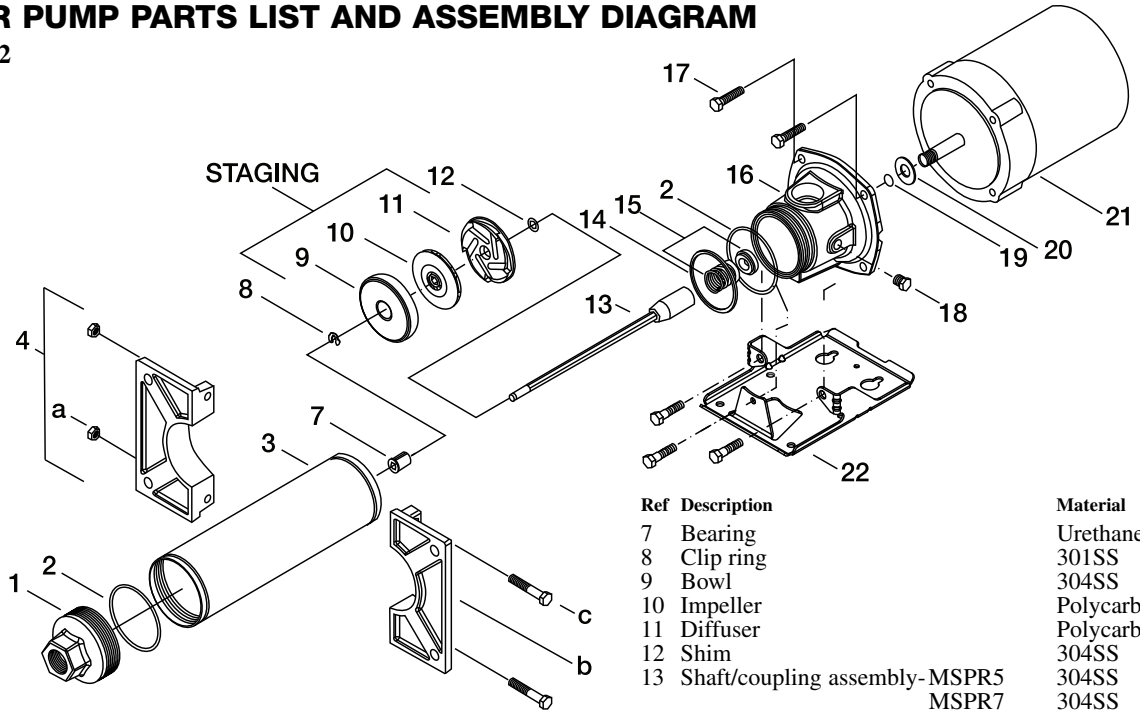
b) Repairing or replacing (at **Graymills** sole discretion), components supplied by, but not manufactured by **Graymills**, to the extent of the warranty given by the original manufacturer.

Buyer must give **Graymills** prompt notice of any defect or failure.

If you believe that you have a Warranty claim, contact **Graymills** at (773)248-6825. Any return material must have an RMA number on the outside of the package and shipping prepaid or shipment will be refused. **Graymills** will promptly examine the material and determine if it is defective and within the Warranty period.

MSPR PUMP PARTS LIST AND ASSEMBLY DIAGRAM

Figure 2



Ref	Description	Material	Part Number
1	Suction head	Cast iron	789-90321
2	O-ring, casing (2 required)	Viton	789-90319
3	Casing MSPR5	304SS	789-90312
	MSPR7	304SS	789-90382
	MSPR9	304SS	789-90383
	MSPR13	304SS	789-90323
4	Vertical Mounting Flange Kit (optional)		C-32106
	a Nut	Steel	
	b Clamp	Cast iron	
	c Bolt	Steel	

Ref	Description	Material	Part Number
7	Bearing	Urethane	789-90317
8	Clip ring	301SS	789-08090
9	Bowl	304SS	789-08429
10	Impeller	Polycarbonate	789-08088
11	Diffuser	Polycarbonate	789-08089
12	Shim	304SS	789-09502
13	Shaft/coupling assembly- MSPR5	304SS	789-90310
	MSPR7	304SS	789-90320
	MSPR9	304SS	789-90387
	MSPR13	304SS	789-90388
14	Spacer	Polycarbonate	789-90474
15	Mechanical seal	Sil/Carb/Vit	789-08092
16	Motor adapter	Cast iron	789-90314
17	Screw, motor adapter to motor	Steel	789-09505
18	Pipe plug	Steel	724-02124-13
19	O-ring, motor shaft	BUNA	789-90318
20	Slinger	Polyethylene	744-11817
21	Motor - MSPR5, 1 HP	Shaft 300SS	789-08082
	MSPR7, 1.5 HP	Shaft 300SS	789-08083
	MSPR9, 2 HP	Shaft 300SS	789-08084
	MSPR13, 3 HP	Shaft 300SS	789-08819
22	Horizontal Mounting Flange Kit		789-90705