

Domestic[®] Pump Series MJ[™] Industrial and Clinical Vacuum Units



INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE.



SAFETY INSTRUCTION

This safety alert symbol will be used in this manual and on the unit safety instruction decals to draw attention to safety related instructions. When used the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.**

If the decals as noted to the right are missing or are illegible contact your local B&G representative for a replacement.

1. Electrical connections to be made by qualified Electrician in accordance with all National, State and Local codes.
2. Motor must have properly sized starter with properly sized heaters to provide overload and undervoltage protection.
3. If pump, motor or piping are operating at extremely high or low temperatures, guarding or insulation is required.
4. Operating personnel should be trained in the operation of vacuum units.

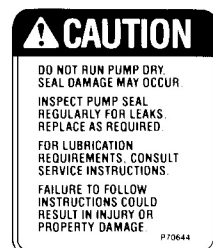


WARNING / MEDICAL WASTES

Medical wastes can carry into the vacuum storage tank and into the vacuum unit. Sterilize, disinfect and use rubber gloves and other protective devices as required by local conditions.

Failure to follow this instruction may result in exposure to serious diseases.

TM		
SERIES TM		
MODEL		
SERIAL		
GPM	PSI	PUMP
CFM	IN. HG.	PUMP
DWGS		
POWER V. PH. HZ 60		
CONTROL V. PH. 1 HZ 60		
TOTAL F.L. AMP.	LARGEST MOTOR F.L. AMP.	
		



P70644

DESCRIPTION



WARNING / CONTAMINATION

Vacuum producers may accumulate residues from the system. In Medical applications, this could include contagious or infectious substances.

Failure to act accordingly could result in serious disease.

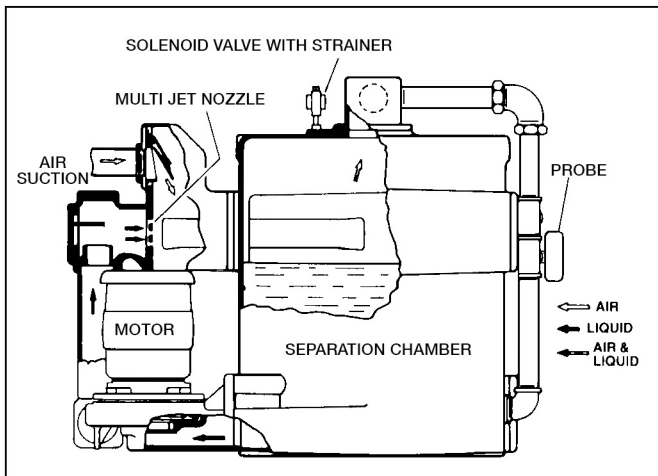
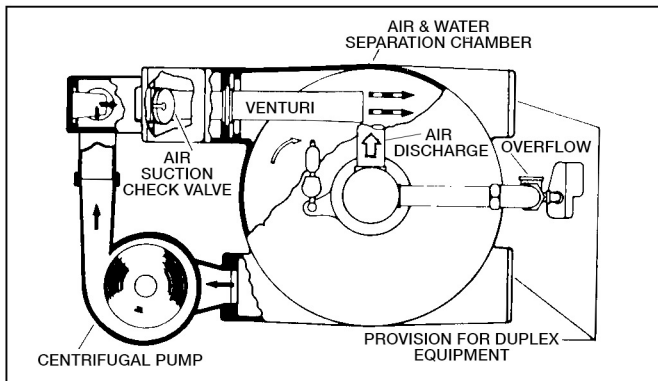
Local procedures must be established to provide for cleaning, sterilization or other processes as appropriate for medical applications.

Procedures should be established to keep all pump/motor units exercised. The lead and lag pumps should be alternated on a regular basis (where applicable).

The heart of the Series MJ unit is the dependable multi-jet vacuum producer. It is a simple, effective device designed to give years of trouble-free service.

The MJ unit is used to draw as much as 28 inches Hg vacuum quietly and reliably. The unit can satisfactorily handle gases, liquids and even small solids.

The centrifugal pump circulates water (the usual hurling medium) through the multi-jet nozzle and venturi and returns it to the separation chamber. The water, forced at high velocity across the gap between nozzle and venturi, entrains air and gases in multiple jet streams, creating a smooth, steady vacuum in the air suction line and vacuum system. The mixture is discharged through the venturi tangentially into the separation chamber. This causes the water in the separation chamber to rotate resulting in a centrifugal action which forces the water to the periphery of the chamber while the lighter air flows to the center and is discharged. Besides effectively separating the air and gases from the water, the centrifugal motion in the same direction as the discharge from the venturi reduces the resistance pressure at the outlet of the venturi and simultaneously increases the pressure at the centrifugal pump suction, promoting high efficiency.



PRELIMINARY INSPECTION

Assure that there is no shipping damage.

Assure that nameplate ratings agree with job specifications and actual conditions.

HANDLING

Use care in installing unit.



CAUTION / UNIT LIFTING EYE

Use unit lifting eyes only to lift unit as shipped from factory.

Unit must be empty and disconnected from pipes, anchors and other restraints.

Use proper rigging procedures.

Failure to follow these instructions could result in injury or property damage.

LOCATION

Place unit for easy access to all parts. Allow adequate space for servicing. Check ambient conditions.

NOTICE / TEMPERATURE LIMITS

Motors are designed to operate in 104°F max. ambient. Insulate or ventilate as required.

PIPING (General)

Pipe the unit per the elementary piping diagram furnished with the unit (or as shown on page 3).

PIPING (Suction)

Use a suction line at least as large as the unit inlet fitting. Vacuum storage tanks will reduce system surges or short cycling and a vertical tank can trap liquids and solids.

PIPING (Vent)

Install a vent pipe to atmosphere. Pipe to be size of vent port on unit.

PIPING (Overflow)

Pipe overflow port to drain.

PIPING (Water Make-Up)

The water make-up assembly should be connected to "city water." Use piping equal in diameter to the piping provided (or one size larger for lines over 100' long). Use back flow preventers or air gaps as required by code.

HURLING WATER CONTROL

The hurling water level is automatically controlled by a solenoid valve actuated by a float switch. To operate at a high vacuum, the water must be at a low temperature resulting in a low vapor pressure. Cooling water can be automatically admitted by using a temperature limit switch. This temperature limit switch actuates the solenoid valve if the temperature rises above a pre-set point.

VACUUM SWITCH ADJUSTMENTS

Vacuum switches, when furnished, are factory adjusted and tested for the specified operating range. If settings must be readjusted, refer to manufacturer's instructions.

ELECTRICAL WIRING & CONTROLS

Connect power wiring per National Electrical Code. Recheck nameplate vs specifications and conditions. All single phase motors have internal thermal protection.

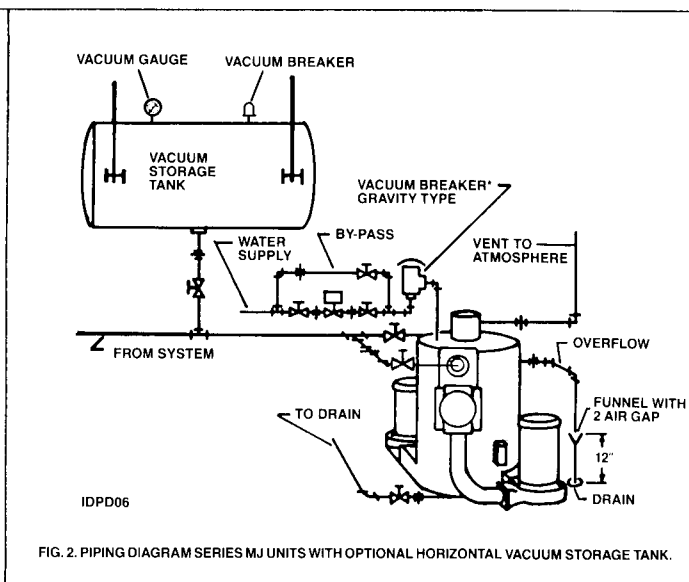
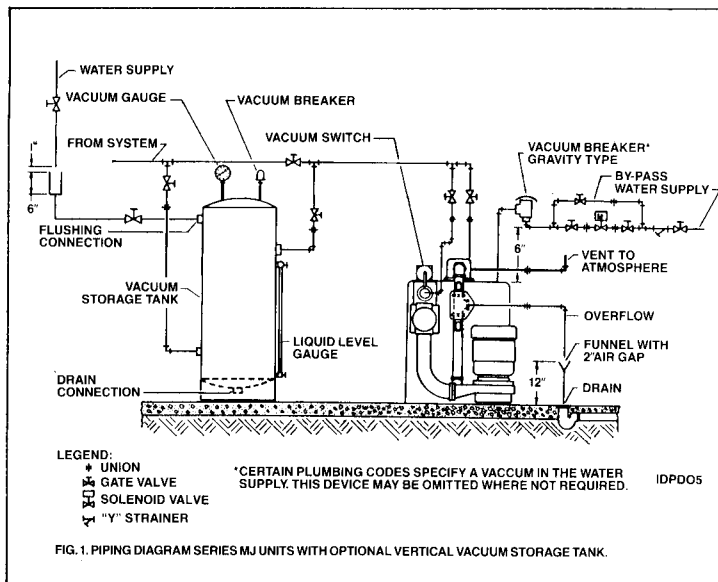


WARNING / HIGH VOLTAGE ELECTRICITY

Disconnect and lock out power before connecting or servicing unit.

Failure to follow these instructions could result in serious injury or death.

Three phase motors must use starters with properly sized overload relays. Overload relays furnished are designed for manual reset.



REPRESENTATIVE PIPING DIAGRAMS

PUTTING THE UNIT INTO SERVICE



WARNING / MEDICAL WASTES

In medical applications, medical wastes can carry into the vacuum storage tank or into the vacuum unit.

The vertical storage tank is intended to intercept most, but not 100%, of those wastes. Disinfectants or other treatment compounds may be added thru the flushing connection as locally desired.



WARNING / AVOID REACTIVE CHEMICALS

Avoid drawing explosive, flammable, highly corrosive or otherwise highly reactive liquids or vapors into the hurling chamber.

Failure to follow these instructions could result in serious injury, death or extensive property damage.



WARNING / EXPLOSIBLE

Do not pressurize receiver. Do not plug overflow. Do not restrict vent opening to atmosphere.

Failure to follow these instructions could result in serious injury or death.

1. Assure that the unit is piped in accordance with instructions and diagrams.

Confirm that incoming power agrees with ratings of motors and that wiring diagrams (when furnished) match specifications and job requirements.

A variety of control options are available. Refer to the wiring diagram (when furnished) for information on electrical controls.

2. Check float and make-up solenoid for proper operation.
3. Check power leads in accordance with wiring diagram enclosed in control cabinet (when furnished).



WARNING / HIGH VOLTAGE

Disconnect and lock out power before connecting or servicing unit.

Failure to follow these instructions could result in serious injury or death.

4. Install drain plugs.
5. Fill receiver half full of water to prime pump(s) and prevent possible damage to pump seals. Avoid freezing conditions after unit receiver has been filled.
6. Check for proper rotation of all three phase motors. Rotation must be clockwise looking down on the motor as indicated by directional arrow on pump casting. If pump runs backwards, interchange two wires (3 phase only).



CAUTION / DO NOT REVERSE

Reverse operation can cause extensive damage to pumps. Jog the motor to test for direction of rotation.

Failure to follow these instructions could result in injury or property damage.



CAUTION / DO NOT RUN DRY. SEAL DAMAGE MAY OCCUR.

Inspect pump seal regularly for leaks. Replace as required.

Failure to follow these instructions could result in injury or property damage.

Vacuum switches are factory set per job specifications and readjustment should not be necessary. Refer to switch manufacturer's literature for details of adjusting procedure. If resetting is required, it is helpful to disconnect wiring and set one switch at a time. The "lead" switch must make and break at a slightly deeper vacuum than the "lag" switch.

The electric alternator (when provided) must always operate from the lead vacuum switch.

An optional temperature limit switch is provided to add cooling water to the hurling chamber. Set this switch at the highest temperature possible consistent with required performance (70°F is required for catalog ratings and performance (CFM) decreases with increasing hurling water temperature). The switch should close on rising temperature.

Remove start-up label (below) from panel (if applicable) after complying with instructions.

ELECTRICIAN / INSTALLER / OPERATOR

REMOVE AND DESTROY THIS TAG AFTER—

1. ASSURING THAT ALL PUMPS ROTATE CLOCKWISE PER ARROWS CAST ON VOLUMES.

2. JOG PUMP MOMENTARILY TO TEST — INTERCHANGE ANY TWO MOTOR POWER WIRES TO REVERSE 3PH MOTORS.)

3. ASSURING THAT SHIPPING LOCKS HAVE BEEN REMOVED FROM ALL FLOAT SWITCHES.

If possible, observe operation thru several cycles.



WARNING / MEDICAL WASTES

In medical applications, medical wastes can carry into the vacuum storage tank or into the vacuum producer.

The vertical storage tank is intended to intercept most, but not 100%, of those wastes. Disinfectants or other treatment compounds may be added thru the flushing connection as locally desired.

OPERATION and MAINTENANCE

Operators must be familiar with all sections of this manual to understand the operation of the unit.

Hot water, steam and electricity can be hazardous.



SAFETY INSTRUCTIONS

SEE COVER OF THIS MANUAL



WARNING / HIGH VOLTAGE

Disconnect and lock out power before connecting or servicing unit.

Failure to follow these instructions could result in serious injury or death.

Check motor nameplate for any lubrication requirements. Pumps require no lubrication.

NOTICE / AUTO RESTART

Single phase motors will restart automatically after thermal overload protector trips.

Overload thermal relays in starters must be reset manually.

A properly installed unit should function unattended for long periods of time. Periodic checks to assure proper operation are highly recommended. Refer to trouble shooting section when necessary.

A variety of control options are available and are furnished in accordance with user specifications. Refer to wiring diagrams (when furnished) to determine control switch settings.

Procedures should be established to keep all pump/motor units exercised. The lead and lag pumps should be alternated on a regular basis (where applicable).



CAUTION / SUBSEQUENT DAMAGE

A unit showing symptoms of possible problems (overflow, noise, leaks, vibrations, continual operation, etc.) must be corrected immediately.

Failure to follow this instruction may result in full liability for subsequent injury or property damage.

Gage Glass Maintenance (Vented Systems)

Clean gage glass as required using commercial glass cleaner. Diluted muratic acid may be used if required (observe handling precautions). Never clean gage glass with wire brushes, scrapers or harsh abrasives.

Do not reuse gage glass or packings or seals.

Immediately replace glass which is broken, cracked, chipped, scratched or otherwise damaged. Inspect periodically with a bright concentrated light. Anything which glistens and catches the fingernail or any star-shaped or crescent-shaped mark which glistens is cause for replacement. Any gage glass which appears cloudy or roughened and will not respond to cleaning procedures should be replaced.

When replacing gage glass, use new packings specified for this use. Install glass with sufficient end clearance for expansion (keep glass to metal clearance at each end) and tighten nuts just enough to avoid leakage (do not over tighten).



WARNING / MEDICAL WASTES

Medical wastes can carry into the vacuum storage tank and into the vacuum producer. Sterilize, disinfect and use rubber gloves and other protective devices as required by local conditions.

Failure to follow this instruction may result in exposure to serious diseases.

TROUBLE SHOOTING PROCEDURES

All units are thoroughly tested at the factory before shipment. They should operate satisfactorily without further adjustment if properly installed and providing they have not been damaged by rough handling in transit. If system or unit performance is not satisfactory, refer to the following check list.

Pump Will Not Start

1. The power supply has been interrupted, disconnect switch is open, or selector switch is improperly positioned.
2. Incorrect voltage for motor. Check voltage and wiring with motor characteristics.
3. Incorrect starter coil for power supply.
4. The overload relays in the starter have tripped out and must be reset. Ambient temperature may be too high.
5. Check pump controls or other controls for proper operation.
6. Wiring to control cabinet is incorrect or connections are loose.
7. System has vacuum and vacuum switches are open.

Pump Runs Continuously

1. Pump is running backward. Rotation of three phase motors may be corrected by interchanging any two of the three wires. Rotation should be clockwise looking down on motor.
2. System flow or leaks prevent the unit from developing design vacuum. Vacuum systems must be tight.
3. System is drawing vacuum greater than the vapor pressure of a liquid — the liquid is being boiled and then condensed in the vacuum unit.
4. Holes in the nozzle plate are plugged and the system will not develop vacuum. Inspect and clean nozzle plates.

5. Incorrect liquid level in the hurling chamber (flooded or empty).
6. Improper vacuum switch adjustment or selector switch in "continuous" position.

System Overflows

1. System may be normal. Cooling water is required to lower vapor pressure of hurling water to be able to draw deep vacuum.
2. Temperature limit switch is set lower than required and adds unnecessary water.
3. The design vacuum is greater than the vapor pressure of a liquid within the system. The liquid is being boiled from the system and condensed in the hurling chamber.
4. Temperature limit switch is wired incorrectly.
5. Float switch is improperly adjusted. Remove float switch cover plate and readjust the cam activating the electrical switch.

System Starts and Stops Rapidly

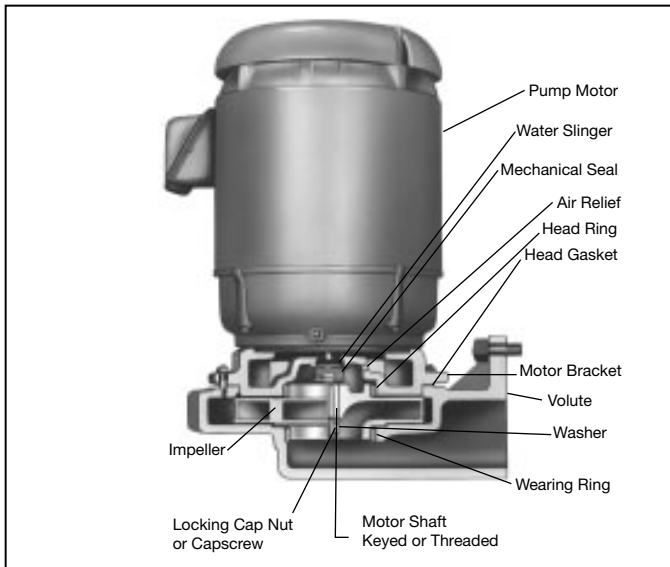
1. Pumping against a small closed system. Add vacuum storage tank or reset vacuum switches.
2. Closed or partially closed valve in air line.
3. Pipe friction losses in suction line cause higher vacuum close to vacuum producer. Relocate vacuum lines to a point which senses true system vacuum.

Both Pumps Run

1. Improper vacuum switch adjustment. Readjust lead vacuum switch to make and break at deeper vacuums than the lag switch.

PUMP SERVICE INSTRUCTIONS FOR VACUUM PRODUCERS

Vertical mounting puts motor above floor dirt and water



Close coupled centrifugal pumps are designed for years of trouble free service. Units have mechanical shaft seals.

1. Drain hurling chamber.



CAUTION / HOT SURFACE

Surfaces are hot when system is in operation. Do not touch hot receiver, let unit cool before servicing.

Failure to follow these instructions could result in serious injury or death.

2. Shut-off and lock out power.



WARNING / HIGH VOLTAGE

Disconnect and lock out power before connecting or servicing unit.

Failure to follow these instructions could result in serious injury or death.

3. Make sure unit is cool enough that pump can be handled safely. Open drain to remove remaining liquid.
4. Carefully remove pump drain plug and bleed line. Wait for complete drainage.
5. Loosen the motor bracket to pump volute capscrews. Assure that pressure is relieved per caution note.



CAUTION / PRESSURIZED SYSTEM

Operating systems may contain very hot water.

Close inlet and open drains before servicing.

When servicing, *loosen* screws and move components to assure pressure is relieved before *removing* screws.

Keep drains open during serving.

Failure to follow these instructions could result in serious injury or death.

6. Complete the removal of the above hardware. Remove pump/ motor assembly and place on work bench.
7. Remove self locking stainless steel capscrews and stainless steel washer (or self locking brass cap nut and washer) that secure the impeller in place.
8. To remove impeller from motor shaft proceed as follows:

- (1) Keyed Shafts. Remove impeller with gear puller or other means which will not damage impeller or bend motor shaft.

- (2) Threaded Shafts. Hold end of motor shaft opposite pump with large screwdriver or other suitable tool and back impeller off with a rectangular bar or other flat tool inserted between the vanes of the impeller.

9. Remove rotating part of seal from shaft, being careful not to break carbon face.
10. Remove capscrews holding motor bracket to motor and remove bracket.
11. Remove stationary part of seal assembly, being careful not to chip or break ceramic seal.
12. To install seal proceed as follows:

- (1) Clean recess in bracket thoroughly. Coat recess and "rubber" portion of seat with soap solution. Press seat into recess firmly by hand making certain both parts bottom evenly. If seal cannot be bottomed with fingers place cardboard shipping disc on ceramic and force into place with tool.

- (2) Carefully place bracket in position on motor shaft without displacing ceramic seat and secure bracket to motor with capscrews.

- (3) Place motor vertically with pump end up. Do not attempt assembly of seal and impeller with shaft horizontal.

- (4) The "carbon" of rotating part of seal should not be loose. If it is, hold in place with grease. Using clean, lint free cloth, wipe mating surfaces perfectly clean. Soap shaft and push seal onto shaft so that carbon will contact ceramic seal. If spacer is required, use grease to cause spacer to adhere to bottom of seal after seal has been put on shaft. Be sure spacer is on larger diameter of shaft so that it will not catch between shoulder and impeller.

13. Replace impeller on shaft. Replace stainless steel washer and secure impeller with capscrew or cap nut.
14. Place new gasket on pump volute and reassemble motor and pump subassembly on pump volute.
15. Reconnect pump bleed line and and motor wiring.



CAUTION / DO NOT RUN DRY.

SEAL DAMAGE MAY OCCUR.

Inspect pump seal regularly for leaks. Replace as required.

Failure to follow these instructions could result in serious injury or death.

16. Close drain and slowly open inlet valves. See warning.



WARNING / EXPLOSIBLE

Do not pressurize receiver. Do not plug overflow. Pipe vent opening to atmosphere. Do not restrict. Open valves slowly.

Failure to follow these instructions could result in serious injury or death.

17. Jog to check motor rotation. See caution.



CAUTION / DO NOT REVERSE

Reverse operation can cause extensive damage to pumps. Jog the motor to test for direction of rotation.

Failure to follow these instructions could result in serious injury or death.

18. Observe operation thru several cycles.

DEALER SERVICING

If trouble occurs that cannot be rectified, contact your local B&G representative. He will need the following information in order to give you assistance.

1. Complete nameplate data of pump and motor.
SEE RATING NAMEPLATE at right.
2. Vacuum readings.
3. Ampere draw of the motor.
4. A sketch of system piping.

TM		
SERIES TM		
MODEL		
SERIAL		
GPM	PSI	PUMP
CFM	IN. HG.	PUMP
DWGS		
POWER V.	PH.	HZ 60
CONTROL V.	PH. 1	HZ 60
TOTAL F.L. AMP.	LARGEST MOTOR F.L. AMP.	
Bell & Gossett		

DN0016



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