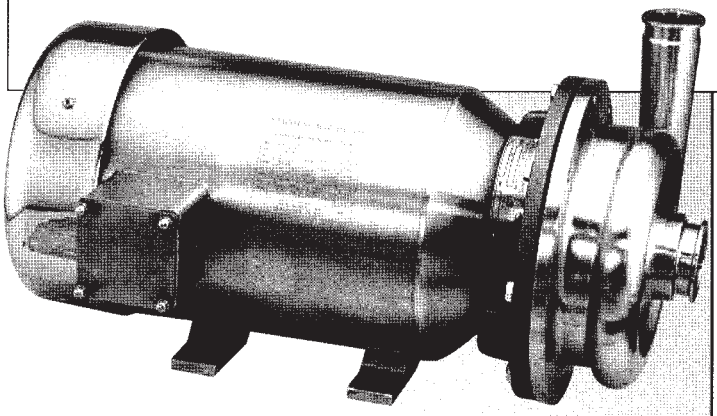
MC2/MCH2 Pumps



INSTRUCTIONS

Your Ampco centrifugal pump is a rugged unit designed to provide years of low cost pumping service. There is a small amount of necessary care required to ensure you of this expected long service. It is recommended that you carefully review the installation and operating sections in this manual.

Every Ampco pump receives a careful running test at the factory to ensure that the head-capacity rating is met in accordance the Hydraulic Institute Standards and to ensure mechanical soundness. Special instructions and advice for unusual conditions, such as corrosive, abrasive, and other problems are too numerous to be included in this general book, but will be the subject of specific discussion on orders or inquires for special applications.

LOCATION

The immediate environment, in which the unit is located, while usually of prime importance to the pump, may determine the enclosure needed for the motor. Ampco can supply several different motor enclosures to meet specific requirements.

The M-Series pumps series are supplied with totally enclosed motors as standard. They may be installed where dirt, moisture and mild corrosion are present or in outdoor locations. Washdown duty motors, with epoxy paint or paint-free stainless steel, are designed for applications where the motor is frequently subject to washdown to maintain a bacteria-free operating environment. Specialty motors may be required for moist, corrosive, or explosive environments. Motor drain plugs (if not equipped with automatic drains) must be removed periodically to drain accumulated condensation.

Pump units should be located where daily visual inspection is possible and no surrounding structure interferes with ventilating air over or through the motor.

Submerged suction is the most economical and convenient method of priming a pump when installed in such a position that the top of the casing is below the surface of the liquid to be pumped. The liquid will flow by gravity into the pump and displace the air (through the discharge if possible or a vent when available).

INSTALLATION

Begin with a suction line as direct and as simple as possible. The suction line is usually the most sensitive part of the entire pumping system being totally dependent on outside forces to provide liquid flow into the eye of the impeller.

Locate the pump as close to the supply of liquid as possible, with short and direct suction piping. Use wide radius elbows to help reduce friction loss. Air pockets due to high sections, concentric reducers, valve bonnets, etc. should be eliminated by installing a suction line having a continual rise or at very least a straight horizontal run with a air eliminator near the pump suction entry. To prevent air pockets use eccentric pipe reducers that are mounted in a horizontal position across the top of the pipeline and valves that can be positioned is a plane other then the normal upright position as an air pocket may exist in the upright valve bonnet.

Above all, remember that until the liquid reaches the leading edges of the rotating impeller vane the pump cannot impart its energy to move the liquid.

STARTING

The pump must be primed before starting, as the mechanical seal depends on the liquid being pumped for lubrication and cooling. Even a short run to determine direction of rotation without first priming may seriously damage the seal.

The correct direction of rotation is counter-clockwise when viewed from the suction end of the pump. It is recommended to turn the pump by hand before starting the first time to ensure the unit is not binding.

MAINTENANCE

Since long-term breakdown cannot be tolerated in most services, maintenance procedures and a contingency plan must be established in advance to minimize any production loss caused by down time.

During building and start-up it is common to use outside personnel. Operating personnel should acquaint themselves with the pump, particularly its running performance. This will aid in establishing a standard for future reference. This manual and other information provided with the pump should be filed for future reference.

All possible performance data should be recorded once the system is functioning properly and stable. Suction and discharge pressure readings, flow rate, seal leakage rate, bearing temperature, noise and vibration levels all provide input to a pump's performance in the system. It is unlikely all this data can be measured, but any information gathered can help alert the user of problems with the pump or system.

Operating personnel should know that any changes in the system or the liquid being pumped might have an effect on the pump's performance. It is advisable to also record the fluid temperature, specific gravity, viscosity, liquid concentration, percent of solid concentration, other additives and properties.

A proper maintenance procedure should begin with a file for each pump. All known data relative to the pump, fluid handled

and system should be included. Complete records of maintenance and repair costs along with a log with the unit's operating hours should be kept. In addition, complete pump identification- size, type, operating speed, manufacturer, serial number, model number, and material of construction should be noted.

Maintenance Procedures

Daily Check-possibly the most important inspection will be the daily observation.

1. Seal leakage rate
2. Pressure reading and flow indication
3. Change in operating sound
4. Change in bearing temperature

Semi-Annual Inspection-typically made at 6-month intervals with results noted in pump's maintenance file.

1. Check of mechanical seal assembly
2. Check of bearing lubrication

Annual Inspection-includes Semi-Annual inspection plus:

3. Check of shaft sleeve wear
4. Removal of seal for inspection
5. Bearing Check
6. Check of axis/running clearance of impeller

Contingency Plan

For inspection findings and breakdowns, a contingency plan should be developed. To begin with, an adequate supply of probable replacement parts should be kept on hand.

The minimum recommended spare parts are as follows:

1. Mechanical seal kit (complete with o-ring set)
2. Shaft Sleeve
3. Impeller Key

In addition Ampco recommends

4. Impeller
5. Impeller Screw

Where service cannot be interrupted, a complete stand-by pump unit fully assembled (and in a by-pass line) is recommended.

DISMANTLE AND REPLACE PARTS AS FOLLOWS (External Type 8B2 Seal):

Before attempting any service on the pump or motor, disconnect or lock out electrical power to the pump motor. If the pump and motor are to be removed as a unit, note the wiring configuration. Use colored or numbered tape to mark the wire connections of the motor and power source, for reconnection.

1. Remove casing by unbolting eight casing bolts. There is a choice of (a) first removing the inlet and discharge piping, or (b) sliding the motor and remaining pump parts back and free of the casing without disturbing the piping.

2. Remove the impeller screw. Ease the impeller off the shaft. Pinch bars between the impeller and cover may be required. Be careful not to mar the pump's surface finish. Remove the impeller key.

3. The cover may now be removed from the adapter or pedestal. This is a piloting fit, pry if tight. Remove the shaft sleeve and rotating parts of the mechanical seal by loosing the setscrew and drawing the sleeve off the shaft (Initial use of anti-seize lubricant should permit hand removal). A puller, if necessary, should be the type that grips the O.D.

The fluid end is now completely dismantled: additional procedures are dictated by purpose for which unit was dissembled.

These instructions are limited to fluid ends only. See other drawings and literature applicable to motors, pedestals, frames, shafts, bearings, etc., if additional repairs are required.

The Mechanical seal is the only expendable pump part. It is suggested that the complete mechanical seal, both stationary and rotating members, be replaced whenever dripping or leakage occurs at the shaft, or whenever parts are removed to the point of separating the primary sealing surfaces. Replace shaft sleeve if worn or damaged.

4. Press the seal's stationary seat with cup or quad-ring out of the cover.

5. Loosen the set screws holding the shaft sleeve and remove the shaft sleeve and rotating parts of the mechanical seal by drawing the sleeve off the shaft (Initial use of anti-seize lubricant should permit hand removal).

6. Thoroughly clean sleeve, seat cavity and shaft and dry with a clean cloth.

Loss of capacity and/or head due to excessive running clearance (1/32" or more) between impeller and casing may be restored by shimming the shaft sleeve.

Replacement of parts is accomplished by substituting during normal assembly as follows:

Mechanical Seal Replacement and Reassembly

1. To position the rotating portion of the mechanical seal, slide the seal onto the sleeve to the shoulder and locking the setscrews into the shaft sleeve. Oiling the O.D. of the sleeve and the I.D. of the seal facilitates assembly (Use soap, petro gel, glycerin, etc. if oil is not permitted i.e. EPDM). Do not use grease.

2. Lubricate I.D. of sleeve and shaft O.D. with an anti-seize lubricant. Slide sleeve with seal parts onto the shaft. Lock the shaft set screw into the motor shaft.

3. Lightly oil the cover bore and finger press stationary seat into this cavity. Seat (usually ceramic) is fragile. Do not abuse.

4. Slip the cover and seat over the shaft into its locating bore positioning the internal bypass hole between 1 and 2 o'clock for top discharge. Avoid bumping the seat into the shaft, the carbon washer should contact its mating stationary seat before the cover engages the adapter shoulder. Continue to push the cover through the seal parts until the sleeve nears its final position.

5. Place the o-ring in the end of the sleeve. Insert the key into the motor shaft. Place the o-ring in the impeller and slide the impeller onto the shaft over the key. Use blue Loctite #242 on the impeller screw threads and hand tighten the impeller screw.

6. Tighten the impeller screw with a 6 pt socket until the sleeve is against the shaft shoulder and all rotating parts are secure (25 ft lbs). Check the freedom of parts by hand rotating the impeller.

7. Install a new casing o-ring in the groove of the cover. Place the casing in position and secure with the eight cap screws. Tighten the cap screws uniformly (25 ft lbs). Rotate the impeller by hand again to check for rubbing.

One way to damage a new seal is to run it dry. Be sure the pump is in place and primed before operating.

8. Place the pump back into service and inspect for proper rotation and leaks.

DISMANTLE AND REPLACE PARTS AS FOLLOWS (Internal CRO Seal):

Before attempting any service on the pump or motor, disconnect or lock out electrical power to the pump motor. If the pump and motor are to be removed as a unit, note the wiring configuration. Use colored or numbered tape to mark the wire connections of the motor and power source, for reconnection.

1. Remove casing by unbolting eight casing bolts. There is a choice of (a) first removing the inlet and discharge piping, or (b) sliding the motor and remaining pump parts back and free of the casing without disturbing the piping.

2. Remove the impeller screw. Ease the impeller off the shaft. Pinch bars between the impeller and cover may be required. Be careful not to mar the pump's surface finish. Remove the impeller key.

3. The shaft sleeve and rotating parts of the mechanical seal are removed by drawing the sleeve off the shaft (Initial use of anti-seize lubricant should permit hand removal). A puller, if necessary, should be the type that grips the O.D. The cover may now be removed from the adapter or pedestal. This is a piloting fit, pry if tight.

The fluid end is now completely dismantled: additional procedures are dictated by purpose for which unit was dissembled.

These instructions are limited to fluid ends only. See other drawings and literature applicable to motors, pedestals, frames, shafts, bearings, etc., if additional repairs are required.

The Mechanical seal is the only expendable pump part. It is suggested that the complete mechanical seal, both stationary and rotating members, be replaced whenever dripping or leakage occurs at the shaft, or whenever parts are removed to the point of separating the primary sealing surfaces. Replace shaft sleeve if worn or damaged.

4. The seal's o-ring may stick tightly to the sleeve. Lightly oil the sleeve or cut away with a knife. Remove spring.

5. Press the seal's stationary seat with o-ring out of the cover.

6. Thoroughly clean sleeve, seat cavity and shaft and dry with a clean cloth.

Loss of capacity and/or head due to excessive running clearance (1/32" or more) between impeller and casing may be restored by shimming the shaft sleeve.

Replacement of other parts is accomplished by substituting during normal assembly as follows:

Mechanical Seal Replacement and Reassembly

The rotating portion of the mechanical seal is positioned by sliding the mechanical seal along the sleeve as the impeller screw draws the impeller into place. Oiling (use food grade lubricants if required) the O.D. of the sleeve and the I.D. of the seal facilitates this by providing a film for the o-ring to slide on (Use soap, petro gel, glycerin, etc. if oil is not permitted i.e. EPDM). Do not use grease, as this would prevent o-ring from setting. Final adherence to the sleeve is essential for shaft sleeve and seal to rotate as a unit.

Proceed as follows:

1. Lightly oil the cover seal bore and finger press stationary seat with o-ring into this cavity. Seat (usually carbon) is fragile. Do not abuse.

2. Oil and hand fit (no tools) rotating portion of mechanical seal onto sleeve. Check direction, ceramic should face small end of the sleeve and spring should catch on shaft sleeve shoulder. Complete assembly without delay after seal is placed on the sleeve.

3. Slip cover and seat over the shaft into its locating bore positioning the internal bypass hole between 1 and 2 o'clock for top discharge. Avoid bumping the seat into the shaft.

4. Lubricate I.D. of sleeve and shaft O.D. with an anti-seize lubricant. Slide sleeve with seal parts onto the shaft, the ceramic rotating element should contact its mating stationary seat before the sleeve engages the shaft shoulder. Continue to push the sleeve through the seal parts until the sleeve nears its final position.

5. Place the o-ring on the end of the sleeve. Align the keyways and insert the key. Place the o-ring in the impeller and slide the impeller onto the shaft over the key. Use blue Loctite #242 on the impeller screw threads and hand tighten the impeller screw.

6. Tighten the impeller screw with a 6 pt socket until the sleeve is against the shaft shoulder and all rotating parts are secure (3/8-16 imp screw - 25 ft lbs 1/2-13 imp screw - 45 ft lbs). Check the freedom of parts by hand rotating the impeller.

7. Install a new casing o-ring in the groove of the cover. Place the casing in position and secure with the eight cap screws. Tighten the cap screws uniformly (25 ft lbs). Rotate the impeller by hand again to check for rubbing.

One way to damage a new seal is to run it dry. Be sure the pump is in place and primed before operating.

8. Place the pump back into service and inspect for proper rotation and leaks.

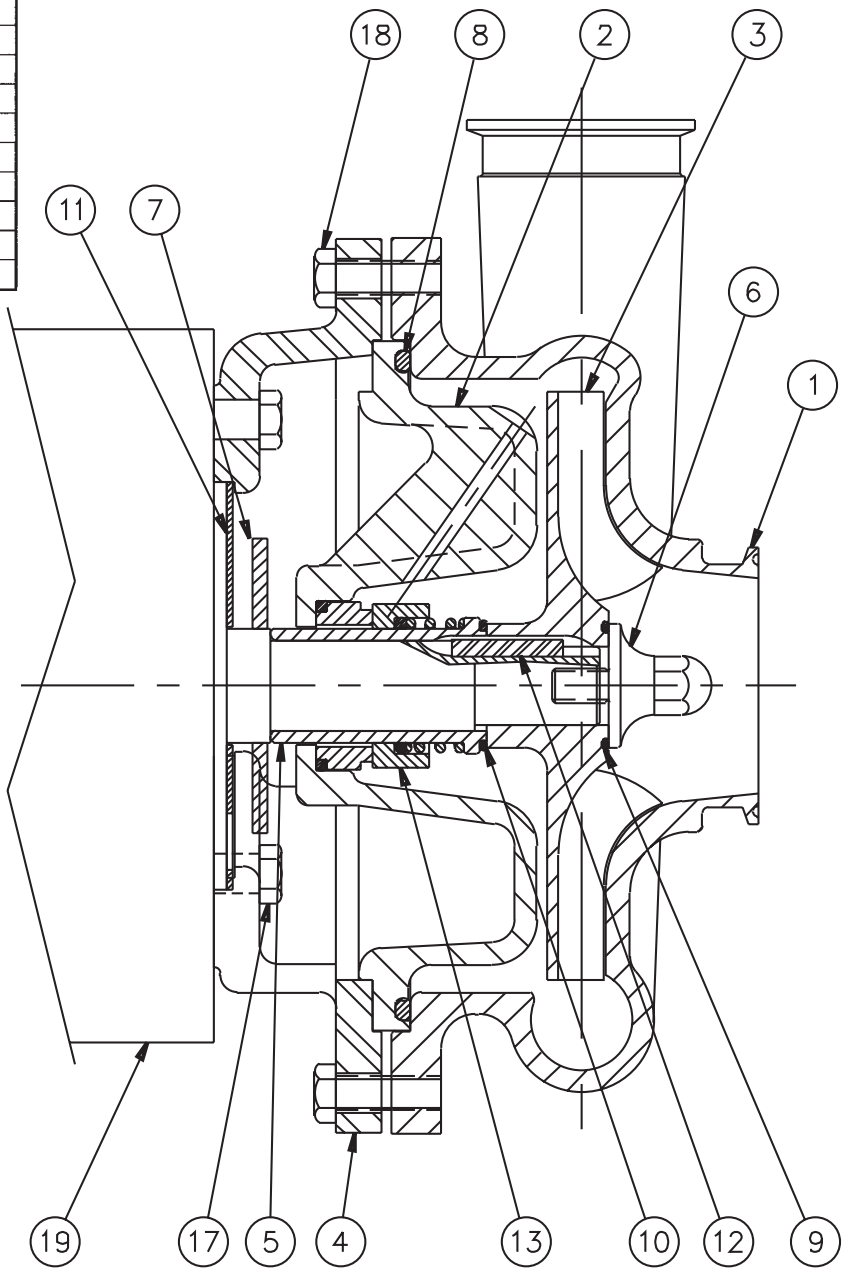
MC2 PUMPS
INTERNAL CRO SEAL
2x1½, 2½x2, 3x2½

AMPCO PUMPS COMPANY
PARTS BREAKDOWN

DETAIL NO.	REQ. NO.	PART NAME
19	1	MOTOR
18	8	CAP SCREW (CASING/ADAPTER)
17	4	CAP SCREW (MOTOR/ADAPTER)
16[1]	2	DRIVE SCREW
15[1]	1	NAME PLATE
13	1	MECHANICAL SEAL
12	1	IMPELLER KEY
11	1	SPLASH PLATE
10	1	O-RING (SLEEVE/IMPELLER)
9	1	O-RING (IMPELLER SCREW)
8	1	O-RING (CASING/COVER)
7	1	SLINGER
6	1	IMPELLER SCREW
5	1	SHAFT SLEEVE
4	1	ADAPTER
3	1	IMPELLER
2	1	COVER
1	1	CASING

[1]NOT SHOWN

NOTE: Please be sure to always include pump type, size, and serial number with any reference to above numbers and names.



MC2 PUMPS
EXTERNAL SEAL
2x1½, 2½x2, 3x2½

AMPCO PUMPS COMPANY
PARTS BREAKDOWN

DETAIL NO.	REQ. NO.	PART NAME
20	1	SET SCREW
19	1	MOTOR
18	8	CAP SCREW (CASING/ADAPTER)
17	4	CAP SCREW (MOTOR/ADAPTER)
16[1]	2	DRIVE SCREW
15[1]	1	NAME PLATE
13	1	MECHANICAL SEAL
12	1	IMPELLER KEY
11	1	SPLASH PLATE
10	1	O-RING (SLEEVE/IMPELLER)
9	1	O-RING (IMPELLER SCREW)
8	1	O-RING (CASING/COVER)
7	1	SLINGER
6	1	IMPELLER SCREW
5	1	SHAFT SLEEVE
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3	1	IMPELLER
2	1	COVER
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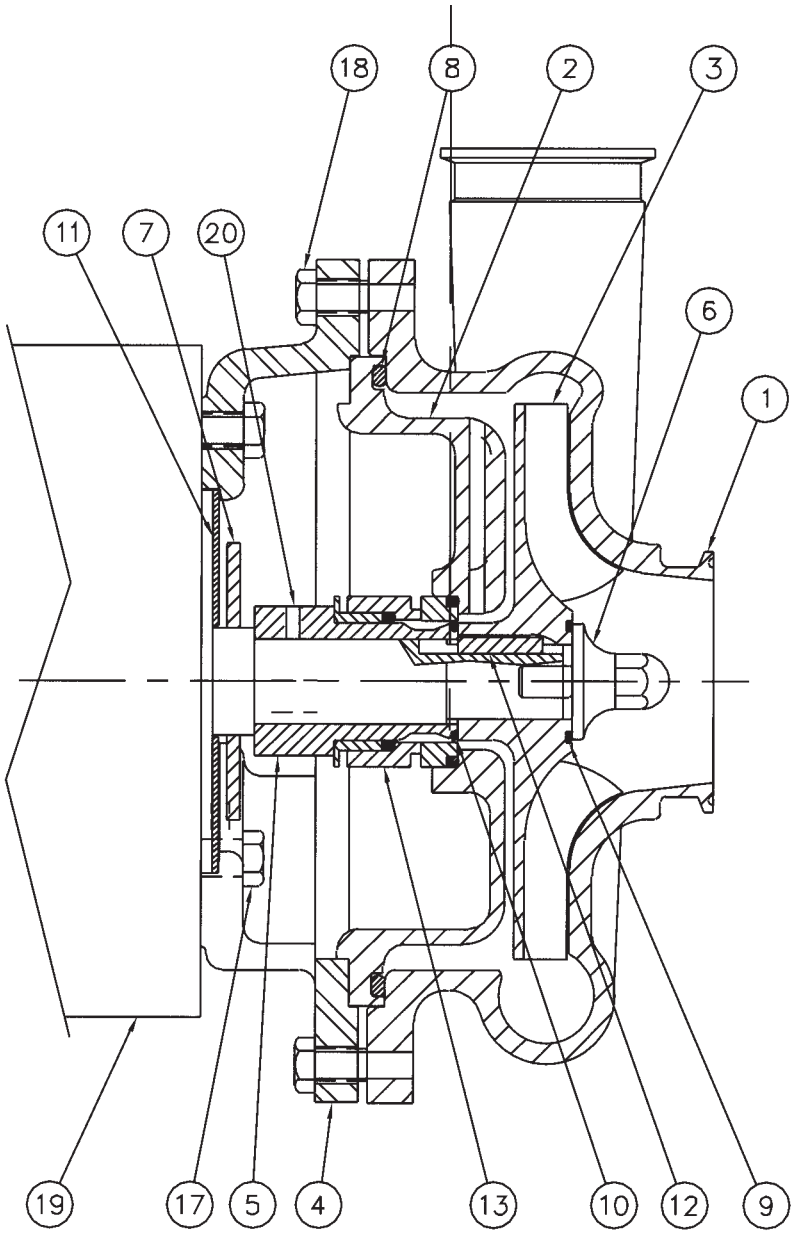

COMMON TROUBLES AND THEIR CAUSES

It is to the user's advantage to be familiar with a systematic procedure to determine reasons and causes for unsatisfactory pump operation. The following list of troubles and causes is intended to assist users in determining the cause of any pumping trouble. Faulty installations can then be corrected and a clear description given the manufacturer if assistance is required. Human judgment should not be relied on to measure operating conditions. Use proper instruments to measure values of pressure, suction lift, speeds, temperature rise of motors, etc. When motor speeds are incorrect, check connections and measure voltage at motor terminals.

1. No liquid delivered

a. Pump and suction line not completely primed
b. Speed too low
c. Required discharge too high
d. Suction lift too high
e. Impeller, piping, or fittings completely plugged up
f. Wrong direction of rotation

2. Not sufficient capacity

a. Air leaks in suction pipe or shaft seal
b. Speed too low
c. Required discharge head too high
d. Suction lift too high or insufficient NPSH available
e. Impeller, piping, or fittings partially plugged
f. Insufficient positive suction head for hot water or other volatile liquids
g. Liquid viscosity too high
h. Mechanical problems - wear rings worn, impeller damaged, shaft seal defective
i. Wrong direction of rotation
j. Suction pipe entrance too close to surface of liquid
k. Air pockets in pipe high points

3. Not sufficient pressure

a. Speed too low
b. Mechanical problems - wear rings worn, impeller damaged, shaft seal defective
c. Small impeller diameter
d. Air or gas in liquid
e. Wrong direction of rotation
f. Air pockets in pipe high points

4. Pump operates for a while, then quits

a. Leaky suction line
b. Air leaking in through shaft seal
c. Suction lift too high or insufficient NPSH available
d. Air or gas in liquid
e. Suction piping and fittings not completely freed of air during priming
f. Air pockets in pipe high points

5. Pump takes too much power

a. Speed too high
b. Pumping too much water because required head is lower than anticipated
c. Viscosity and/or specific gravity is higher than specified
d. Mechanical problems - binding at wear rings from distortion due to piping strains, shaft bent, impeller rubbing casing, stuffing box too tight
e. Wrong direction of rotation

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MC3/MCH3 Pumps

INSTRUCTIONS

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Every Ampco pump receives a careful running test at the factory to ensure that the head-capacity rating is met in accordance the Hydraulic Institute Standards and to ensure mechanical soundness. Special instructions and advice for unusual conditions, such as corrosive, abrasive, and other problems are too numerous to be included in this general book, but will be the subject of specific discussion on orders or inquires for special applications.

LOCATION

The immediate environment, in which the unit is located, while usually of prime importance to the pump, may determine the enclosure needed for the motor. Ampco can supply several different motor enclosures to meet specific requirements.

The M-Series pumps series are supplied with totally enclosed motors as standard. They may be installed where dirt, moisture and mild corrosion are present or in outdoor locations. Washdown duty motors, with epoxy paint or paint free stainless steel, are designed for applications where the motor is frequently subject to washdown to maintain a bacteria-free operating environment. Specialty motors may be required for moist, corrosive, or explosive environments. Motor drain plugs (if not equipped with automatic drains) must be removed periodically to drain accumulated condensation.

Pump units should be located where daily visual inspection is possible and no surrounding structure interferes with ventilating air over or through the motor.

Submerged suction is the most economical and convenient method of priming a pump when installed in such a position that the top of the casing is below the surface of the liquid to be pumped. The liquid will flow by gravity into the pump and displace the air (through the discharge if possible or a vent when available).

INSTALLATION

Begin with a suction line as direct and as simple as possible. The suction line is usually the most sensitive part of the entire pumping system being totally dependent on outside forces to provide liquid flow into the eye of the impeller.

Locate the pump as close to the supply of liquid as possible, with short and direct suction piping. Use wide radius elbows to help reduce friction loss. Air pockets due to high sections, concentric reducers, valve bonnets, etc. should be eliminated by installing a suction having a continual rise or at very least a straight horizontal run with a air eliminator near the pump suction entry. To prevent air pockets use eccentric pipe reducers that are mounted in a horizontal position across the top of the pipeline and valves that can be positioned is a plane other then the normal upright position as an air pocket may exist in the upright valve bonnet.

Above all, remember that until the liquid reaches the leading edges of the rotating impeller vane the pump cannot impart its energy to move the liquid.

STARTING

The pump must be primed before starting, as the mechanical seal depends on the liquid being pumped for lubrication and cooling. Even a short run to determine direction of rotation without first priming may seriously damage the seal.

The correct direction of rotation is counter-clockwise when viewed from the suction end of the pump. It is recommended to turn the pump by hand before starting the first time to ensure the unit is not binding.

MAINTENANCE

Since long-term breakdown cannot be tolerated in most services, maintenance procedures and a contingency plan must be established in advance to minimize any production loss caused by down time.

During building and start-up it is common to use outside personnel. Operating personnel should acquaint themselves with the pump, particularly its running performance. This will aid in establishing a standard for future reference. This manual and other information provided with the pump should be filed for future reference.

All possible performance data should be recorded once the system is functioning properly and stable. Suction and discharge pressure readings, flow rate, seal leakage rate, bearing temperature, noise and vibration levels all provide input to a pump's performance in the system. It is unlikely all this data can be measured, but any information gathered can help alert the user of problems with the pump or system.

Operating personnel should know that any changes in the system or the liquid being pumped might have an effect on the pump's performance. It is advisable to also record the fluid temperature, specific gravity, viscosity, liquid concentration, percent of solid concentration, other additives and properties.

A proper maintenance procedure should begin with a file for each pump. All known data relative to the pump, fluid handled and system should be included. Complete records of maintenance and repair costs along with a log with the unit's operating hours should be kept.

BACK

In addition, complete pump identification- size, type, operating speed, manufacturer, serial number, model number, and material of construction should be noted.

Maintenance Procedures
Daily Check-possibly the most important inspection will be the daily observation.

1. Seal leakage rate
2. Pressure reading and flow indication
3. Change in operating sound
4. Change in bearing temperature

Semi-Annual Inspection-typically made at 6-month intervals with results noted in pump's maintenance file.

1. Check of mechanical seal assembly
2. Check of bearing lubrication

Annual Inspection-includes Semi-Annual inspection plus:

3. Check of shaft sleeve wear
4. Removal of seal for inspection
5. Bearing Check
6. Check of axis/running clearance of impeller

Contingency Plan
For inspection findings and breakdowns, a contingency plan should be developed. To begin with, an adequate supply of probable replacement parts should be kept on hand.

The minimum recommended spare parts are as follows:

1. Mechanical seal kit (complete with o-ring set)
2. Shaft Sleeve
3. Impeller Key

In addition Ampco recommends

4. Impeller
5. Impeller Screw

Where service cannot be interrupted, a complete stand-by pump unit fully assembled (and in a by-pass line) is recommended.

DISMANTLE AND REPLACE PARTS AS FOLLOWS (External Type 8B2 Seal):

Before attempting any service on the pump or motor, disconnect or lock out electrical power to the pump motor. If the pump and motor are to be removed as a unit, note the wiring configuration. Use colored or numbered tape to mark the wire connections of the motor and power source, for reconnection.

These instructions are limited to fluid ends only. See other drawings and literature applicable to motors, pedestals, frames, shafts, bearings, etc., if additional repairs are required.

1. Remove casing by unbolting eight casing bolts. There is a choice of (a) first removing the inlet and discharge piping, or (b) sliding the motor and remaining pump parts back and free of the casing without disturbing the piping.

2. Remove the impeller screw. Ease the impeller off the shaft. Pinch bars between the impeller and cover may be required. Be careful not to mar the pump's surface finish. Remove the impeller key.

3. The cover may now be removed from the adapter or pedestal. This is a piloting fit, pry if tight.

4. Remove the shaft sleeve and rotating parts of the mechanical seal by loosing the setscrew and drawing the sleeve off the shaft (Initial use of anti-seize lubricant should permit hand removal). A puller, if necessary, should be the type that grips the O.D.

5. Remove the four bolts holding the gland and remove the stationary seat and gaskets.

6. Loosen the setscrews holding the rotating part of the mechanical seal and remove from the shaft sleeve.

7. Thoroughly clean sleeve, seat cavity and shaft and dry with a clean cloth.

The Mechanical seal is the only expendable pump part. It is suggested that the complete mechanical seal, both stationary and rotating members, be replaced whenever dripping or leakage occurs at the shaft, or whenever parts are removed to the point of separating the primary sealing surfaces. Replace shaft sleeve if worn or damaged.

The fluid end is now completely dismantled: additional procedures are dictated by purpose for which unit was dissembled.

Loss of capacity and/or head due to excessive running clearance (1/16" or more) between impeller and casing may be restored by shimming the shaft sleeve.

Replacement of parts is accomplished by substituting during normal assembly as follows:

Mechanical Seal Replacement and Reassembly

1. To position the rotating portion of the mechanical seal, slide the seal onto the sleeve to the shoulder and locking the setscrews into the shaft sleeve. Lightly oiling (use food grade lubricants if required) the O.D. of the sleeve and the I.D. of the seal facilitates assembly (Use soap, petro gel, glycerin, etc. if oil is not permitted i.e. EPDM). Do not use grease.

2. Lubricate I.D. of sleeve and shaft O.D. with an anti-seize lubricant. Slide sleeve with seal parts onto the shaft. Lock the shaft set screw into the motor shaft.

3. Insert the stationary seat with one gasket on each side, install the gland, four bolts, and tighten. Seat (usually silicon carbide) is fragile. Do not abuse.

4. Slip the cover and seat over the shaft into its locating bore positioning the internal bypass hole between 1 and 2 o'clock for top discharge. Avoid bumping the seat into the shaft, the carbon washer should contact its mating stationary seat before the cover engages the adapter shoulder. Continue to push the cover through the seal parts until the sleeve nears its final position.

5. Place the o-ring in the end of the sleeve. Insert the key into the motor shaft. Place the o-ring in the impeller and slide the impeller onto the shaft over the key. Use blue Loctite #242 on the impeller screw threads and hand tighten the impeller screw.

6. Tighten the impeller screw with a 6 pt socket until the sleeve is against the shaft shoulder and all rotating parts are secure (25 ft lbs). Check the freedom of parts by hand rotating the impeller.

7. Install a new casing o-ring in the groove of the cover. Place the casing in position and secure with the eight cap screws. Tighten the cap screws uniformly (25 ft lbs). Rotate the impeller by hand again to check for rubbing.

One way to damage a new seal is to run it dry. Be sure the pump is in place and primed before operating.

8. Place the pump back into service and inspect for proper rotation and leaks.

DISMANTLE AND REPLACE PARTS AS FOLLOWS (Internal Seal):

Before attempting any service on the pump or motor, disconnect or lock out electrical power to the pump motor. If the pump and motor are to be removed as a unit, note the wiring configuration. Use colored or numbered tape to mark the wire connections of the motor and power source, for reconnection.

These instructions are limited to fluid ends only. See other drawings and literature applicable to motors, pedestals, frames, shafts, bearings, etc., if additional repairs are required.

1. Remove casing by unbolting eight casing bolts. There is a choice of (a) first removing the inlet and discharge piping, or (b) sliding the motor and remaining pump parts back and free of the casing without disturbing the piping.

2. Remove the impeller screw. Ease the impeller off the shaft. Pinch bars between the impeller and cover may be required. Be careful not to mar the pump's surface finish. Remove the impeller key.

3. The shaft sleeve and rotating parts of the mechanical seal are removed by drawing the sleeve off the shaft (Initial use of anti-seize lubricant should permit hand removal). A puller, if necessary, should be the type that grips the O.D. The cover may now be removed from the adapter or pedestal. This is a piloting fit, pry if tight.

4. The seal's o-ring may stick tightly to the sleeve. Lightly oil the sleeve or cut away with a knife. Remove spring.

5. Press the seal's stationary seat with o-ring out of the cover.

6. Thoroughly clean sleeve, seat cavity and shaft and dry with a clean cloth.

The fluid end is now completely dismantled: additional procedures are dictated by purpose for which unit was dissembled.

The Mechanical seal is the only expendable pump part. It is suggested that the complete mechanical seal, both stationary and rotating members, be replaced whenever dripping or leakage occurs at the shaft, or whenever parts are removed to the point of separating the primary sealing surfaces. Replace shaft sleeve if worn or damaged.

Loss of capacity and/or head due to excessive running clearance (1/16" or more) between impeller and casing may be restored by shimming the shaft sleeve.

Replacement of other parts is accomplished by substituting during normal assembly as follows:

Mechanical Seal Replacement and Reassembly

The rotating portion of the mechanical seal is positioned by sliding the mechanical seal along the sleeve as the impeller screw draws the impeller into place. Lightly oiling (use food grade lubricants if required) the O.D. of the sleeve and the I.D. of the seal facilitates this by providing a film for the o-ring to slide on (Use soap, petro gel, glycerin, etc. if oil is not permitted i.e. EPDM). Do not use grease, as this would prevent o-ring from setting. Final adherence to the sleeve is essential for shaft sleeve and seal to rotate as a unit.

Proceed as follows:

1. Lightly oil the cover seal bore and finger press stationary seat with o-ring into this cavity. Seat (usually carbon) is fragile. Do not abuse.

2. Oil and hand fit (no tools) rotating portion of mechanical seal onto sleeve. Check direction, the face should face small end of the sleeve and spring should catch on shaft sleeve shoulder. Complete assembly without delay after seal is placed on the sleeve.

3. Slip cover and seat over the shaft into its locating bore positioning the internal bypass hole between 1 and 2 o'clock for top discharge. Avoid bumping the seat into the shaft.

4. Lubricate I.D. of sleeve and shaft O.D. with an anti-seize lubricant. Slide sleeve with seal parts onto the shaft, the ceramic rotating element should contact its mating stationary seat before the sleeve engages the shaft shoulder. Continue to push the sleeve through the seal parts until the sleeve nears its final position.

5. Place the o-ring on the end of the sleeve. Align the keyways and insert the key. Place the o-ring in the impeller and slide the impeller onto the shaft over the key. Use blue Loctite #242 on the impeller screw threads and hand tighten the impeller screw.

6. Tighten the impeller screw with a 6 pt socket until the sleeve is against the shaft shoulder and all rotating parts are secure (3/8-16 imp screw - 25 ft lbs 1/2-13 imp screw – 45 ft lbs). Check the freedom of parts by hand rotating the impeller.

7. Install a new casing o-ring in the groove of the cover. Place the casing in position and secure with the eight cap screws. Tighten the cap screws uniformly (25 ft lbs). Rotate the impeller by hand again to check for rubbing.

One way to damage a new seal is to run it dry. Be sure the pump is in place and primed before operating.

8. Place the pump back into service and inspect for proper rotation and leaks.

MC3/MCH3 PUMPS
INTERNAL SEAL

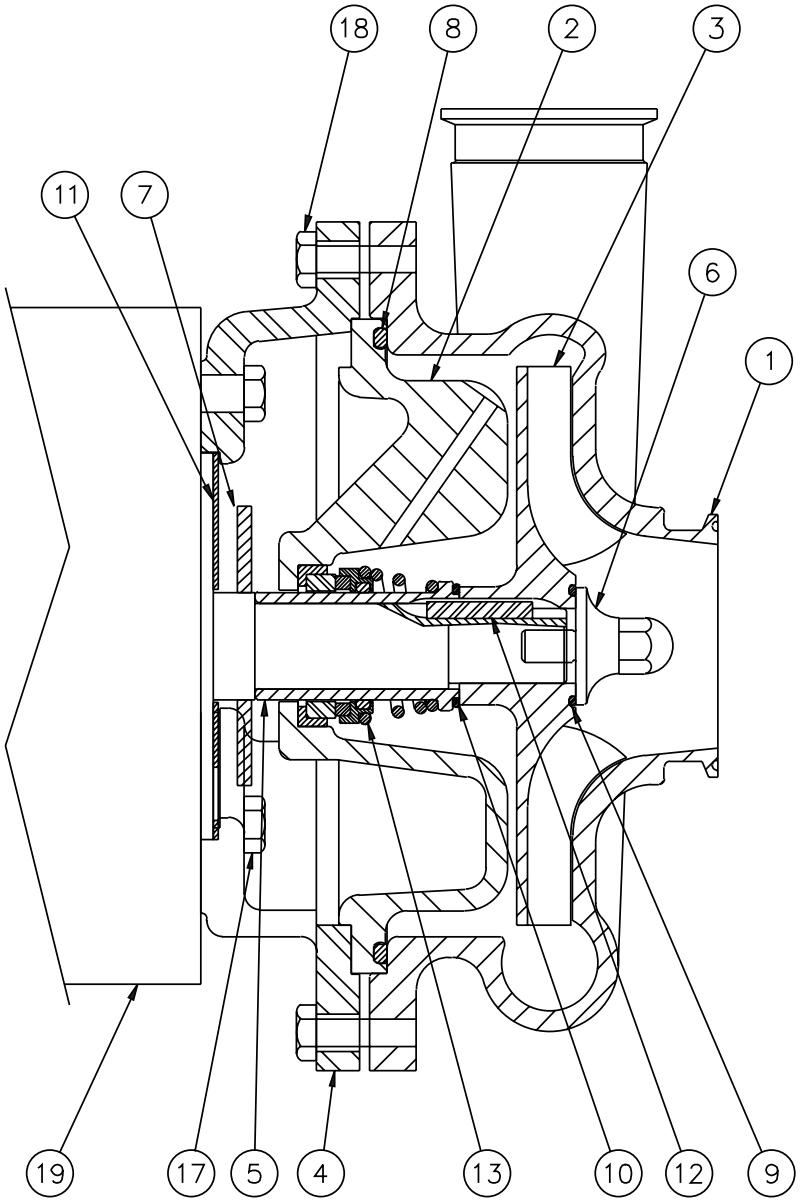
2x1 1/2, 2 1/2x2, 3x2 1/2x7, 3x2 1/2x8 1/2, 4x2 1/2x8 1/2

AMPCO PUMPS COMPANY
PARTS BREAKDOWN

DETAIL NO.	REQ. NO.	PART NAME
19	1	MOTOR
18	8	CAP SCREW (CASING/ADAPTER)
17	4	CAP SCREW (MOTOR/ADAPTER)
16[1]	2	DRIVE SCREW
15[1]	1	NAME PLATE
13	1	MECHANICAL SEAL
12	1	IMPELLER KEY
11	1	SPLASH PLATE
10	1	O-RING (SLEEVE/IMPELLER)
9	1	O-RING (IMPELLER SCREW)
8	1	O-RING (CASING/COVER)
7	1	SLINGER
6	1	IMPELLER SCREW
5	1	SHAFT SLEEVE
4	1	ADAPTER
3	1	IMPELLER
2	1	COVER
1	1	CASING

[1]NOT SHOWN

NOTE: Please be sure to always include pump type, size, and serial number with any reference to above numbers and names.



MC3/MCH3 PUMPS
EXTERNAL SEAL

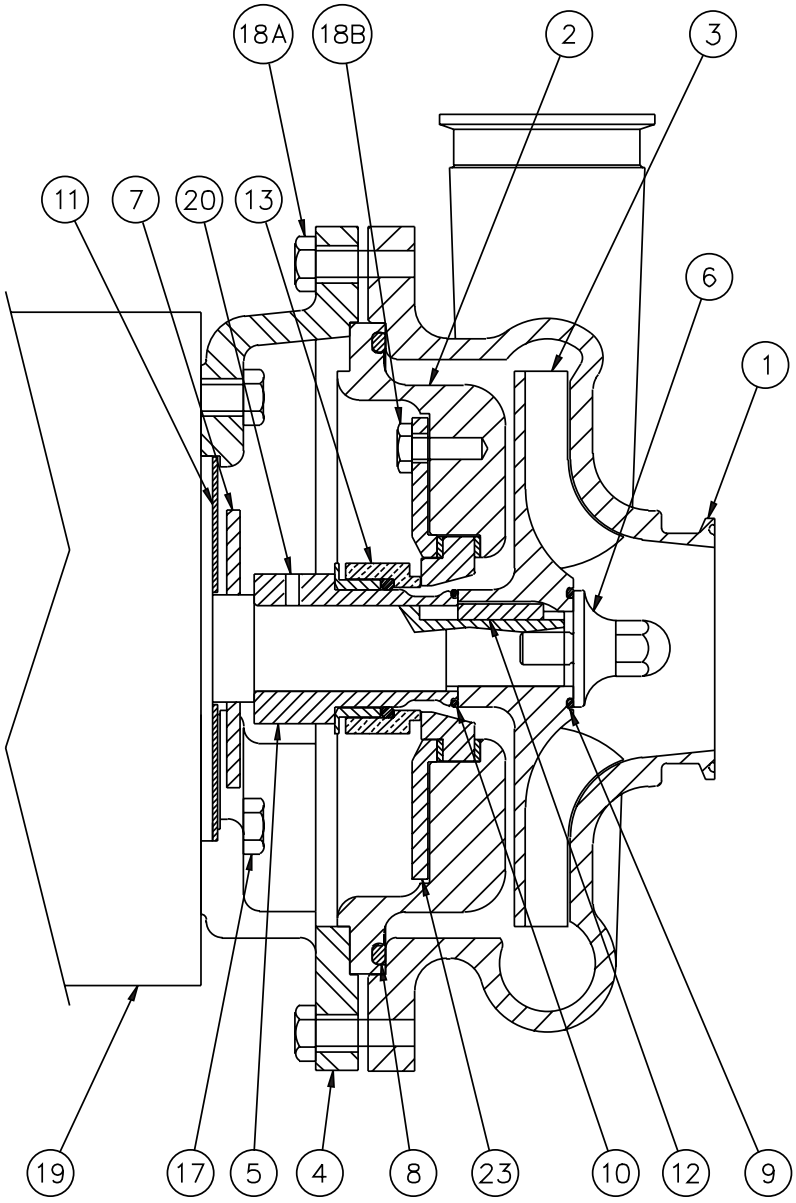
2x1 1/2, 2 1/2x2, 3x2 1/2x7, 3x2 1/2x8 1/2, 4x2 1/2x8 1/2

AMPCO PUMPS COMPANY
PARTS BREAKDOWN

DETAIL NO.	REQ. NO.	PART NAME
23	1	GLAND
20	1	SET SCREW
19	1	MOTOR
18B	4	CAP SCREW (COVER/GLAND)
18A	8	CAP SCREW (CASING/ADAPTER)
17	4	CAP SCREW (MOTOR/ADAPTER)
16[1]	2	DRIVE SCREW
15[1]	1	NAME PLATE
13	1	MECHANICAL SEAL
12	1	IMPELLER KEY
11	1	SPLASH PLATE
10	1	O-RING (SLEEVE/IMPELLER)
9	1	O-RING (IMPELLER SCREW)
8	1	O-RING (CASING/COVER)
7	1	SLINGER
6	1	IMPELLER SCREW
5	1	SHAFT SLEEVE
4	1	ADAPTER
3	1	IMPELLER
2	1	COVER
1	1	CASING

[1]NOT SHOWN

NOTE: Please be sure to always include pump type, size, and serial number with any reference to above numbers and names.



COMMON TROUBLES AND THEIR CAUSES

It is to the user's advantage to be familiar with a systematic procedure to determine reasons and causes for unsatisfactory pump operation. The following list of troubles and causes is intended to assist users in determining the cause of any pumping trouble. Faulty installations can then be corrected and a clear description given the manufacturer if assistance is required. Human judgment should not be relied on to measure operating conditions. Use proper instruments to measure values of pressure, suction lift, speeds, temperature rise of motors, etc. When motor speeds are incorrect, check connections and measure voltage at motor terminals.

1. No liquid delivered
a. Pump and suction line not completely primed
b. Speed too low
c. Required discharge too high
d. Suction lift too high
e. Impeller, piping, or fittings completely plugged up
f. Wrong direction of rotation

2. Not sufficient capacity
a. Air leaks in suction pipe or shaft seal
b. Speed too low
c. Required discharge head too high
d. Suction lift too high or insufficient NPSH available
e. Impeller, piping, or fittings partially plugged
f. Insufficient positive suction head for hot water or other volatile liquids
g. Liquid viscosity too high
h. Mechanical problems - wear rings worn, impeller damaged, shaft seal defective
i. Wrong direction of rotation
j. Suction pipe entrance too close to surface of liquid
k. Air pockets in pipe high points

3. Not sufficient pressure
a. Speed too low
b. Mechanical problems - wear rings worn, impeller damaged, shaft seal defective
c. Small impeller diameter
d. Air or gas in liquid
e. Wrong direction of rotation
f. Air pockets in pipe high points

4. Pump operates for a while, then quits
a. Leaky suction line
b. Air leaking in through shaft seal
c. Suction lift too high or insufficient NPSH available
d. Air or gas in liquid
e. Suction piping and fittings not completely freed of air during priming
f. Air pockets in pipe high points

5. Pump takes too much power
a. Speed too high
b. Pumping too much water because required head is lower than anticipated
c. Viscosity and/or specific gravity is higher than specified
d. Mechanical problems - binding at wear rings from distortion due to piping strains, shaft bent, impeller rubbing casing, stuffing box too tight
e. Wrong direction of rotation

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