



INSTRUCTION MANUAL



MAX SERIES HYDRAULIC MOTOR DRIVEN CENTRIFUGAL PUMPS

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Pump performance data, dimensions, and part listings are on individual pump specification sheets. These specification sheets may be downloaded from the Product Literature page at www.AcePumps.com or call 800-843-2293 to request a copy. Solid models are available at www.3DContentCentral.com.

WARNINGS

AVOID HIGH PRESSURE FLUIDS

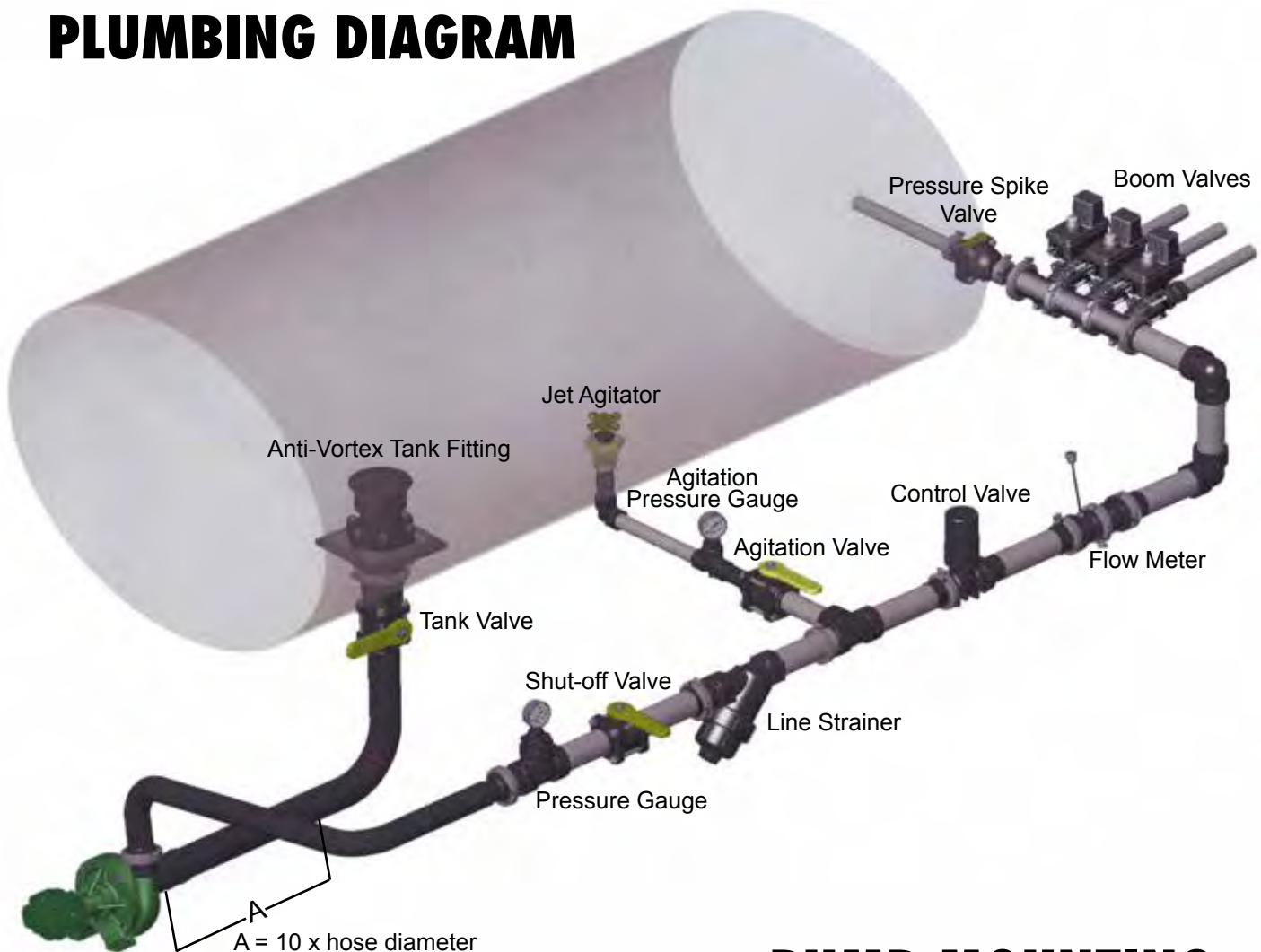


Escaping fluid under pressure may penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic lines. Tighten all connections before applying pressure and inspect hoses regularly for wear or damage. If an accident occurs, seek medical attention immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.

HANDLE CHEMICAL PRODUCTS SAFELY

Direct exposure to hazardous chemicals may cause serious injury. Potentially hazardous chemicals used with Ace Pumps are hydraulic fluid, fertilizer, and chemicals. A Safety Data Sheet (SDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques. Check the SDS before starting any job using a hazardous chemical.

PLUMBING DIAGRAM



PUMP MOUNTING

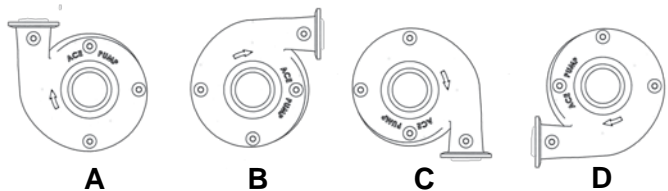
Ace centrifugal pumps are straight centrifugals and must be primed prior to operation. The word “**primed**” means the pump must be completely full of water and any trapped air vented before the pump is operated. Following the pump mounting guidelines will insure proper priming of the pump and avoid premature seal failure.

The following are basic guidelines for proper pump mounting:

- The pump should be mounted below the tank(s) allowing gravity to naturally fill the pump with liquid.
- The volute should be oriented with the discharge port pointing up (A) or across the top (B) of the pump which allows air to rise out of the pump.

If the volute must be oriented at the bottom (C) or across the bottom (D):

1. A vent line is required to continually bleed air from the pump housing. It should be installed from the highest pipe plug hole to the top of the sprayer tank.
 2. A petcock valve can also be installed in the highest pipe plug hole to bleed the air manually each time the tanks are filled.
- If the pump must be located above the liquid level, a foot valve should be installed to maintain the pump's prime.



PLUMBING SUGGESTIONS

The primary goal when plumbing a sprayer pump is to route liquid with minimum restriction. Minimizing restrictions is necessary for achieving the pump's maximum rated capacity. The following are recommended practices to maximize pump performance and efficiency:

- Hoses should be at least the same size as the pump's suction and discharge port. Pump performance may be increased up to 20% by using one size larger suction hose.
A straight run of 10 times the suction hose diameter is recommended prior to the pump inlet.
Example: 1.5" (38.1 mm) hose diameter = 15" (38.1 cm) of straight hose
The straight section provides laminar water flow to the pump.
- A minimum number of elbows, fittings, and valves should be used to reduce pressure losses. These should also be sized properly to prevent flow restrictions.
- An anti-vortex fitting should be installed on the suction port inside the tank. This fitting prevents a vortex from forming when the tank liquid level is low. A vortex will allow the pump to pull air in causing irregular performance or loss of prime.
- Install a pressure gauge and valve on the discharge side of the pump for the purpose of measuring the SHUT-OFF pressure. The SHUT-OFF pressure is needed for the setup of HYD series pumps.
- An agitation flow rate of 5% of the tank capacity is recommended for most chemicals. A higher rate of 10% is suggested for wettable powders and materials difficult to keep in suspension. See the chart below for common tank sizes.

Tank Capacity	5%	10%
500 gallons	25 gpm	50 gpm
750 gallons	37 gpm	75 gpm
1000 gallons	50 gpm	100 gpm
1500 gallons	75 gpm	150 gpm

Tank Capacity	5%	10%
3000 liter	150 lpm	300 lpm
4000 liter	200 lpm	400 lpm
5000 liter	250 lpm	500 lpm
8000 liter	400 lpm	800 lpm

Jet agitators are the most efficient way to agitate a large tank. They operate on an entrainment principle where flow through an orifice is multiplied by capturing surrounding fluid. The flow rate is based on the pressure of the fluid passing through. A pressure gauge installed on the agitation line gives the operator an indication of total agitation flow. This is especially important for high application rates where more flow is needed for the boom.

- A line strainer should be installed on the discharge side of the pump to protect the nozzles from clogging. If a strainer must be used in front of the pump, a large mesh screen should be used to filter debris too large to pass through the impeller vanes.
- The electronic spray control valve and flow-meter should be sized for the desired maximum boom flow based on the application rate and ground speed.
- A pressure spike valve is recommended for use with Ace MAX series models. These models operate at pressures up to 160 psi (11 bar). A pressure spike is generated when the boom is turned off. The spike valve will relieve the pressure back to tank and prevent damage to system components.

M SERIES HYDRAULIC MOTOR FEATURES

Coasting Check - This internal feature is standard on all Ace hydraulic motors. It protects the motor seal from pressure spikes created by the flywheel effect of the impeller when the pump is turned off.

Motor Ports

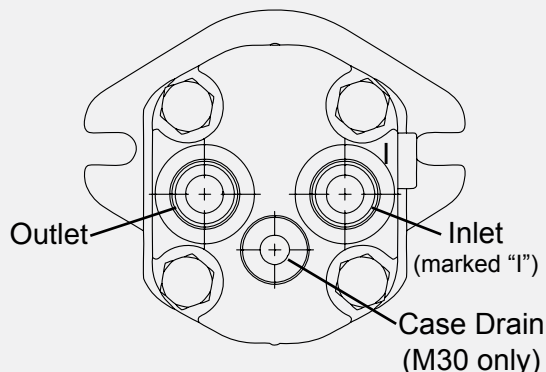
M16, M22, and M25

Inlet & Outlet.....#10 SAE female

M30

Inlet & Outlet.....#10 SAE female

Case Drain.....#6 SAE female



External Motor Fittings

Standard Fittings:

Inlet - Adapter/Restrictor Body (BAC-80-10SAE).....1/2" NPT Female

Outlet - Reverse Check Valve (BAC-78-10SAE).....1/2" NPT Female

Optional Fittings (special order):

Inlet - Adapter/Restrictor Body (BAC-80-10X10SAE).....#10 SAE Female

Outlet - Reverse Check Valve (BAC-78-10X10SAE).....#10 SAE Female

Adapter/Restrictor Body - This fitting serves as an adapter for hose connection on all systems and a housing for the restrictor orifice for 650 models on PC Closed hydraulic systems.

Reverse Check Valve - The external check valve prevents damage by not allowing the pump to run backwards. The valve may be removed when used on engineered systems with a single flow direction.

HYDRAULIC SYSTEM CONNECTIONS

The following hydraulic connection recommendations are important for optimum pump efficiency and motor seal life.

1. Hydraulic hoses should be sized to insure proper oil supply to the motor and minimize return line pressure. Recommended hose sizes are 5/8"(15.9 mm) for M16/M22 motors and 3/4"(19 mm) for M25/M30 motors. The hoses should be sized larger if individual hose lengths exceed 15 feet (4.5 m).
2. The return line should be connected to a low pressure return port if available. The low pressure return port routes oil directly to the reservoir minimizing return line pressure. Low return line pressure extends the motor seal life and increases operating efficiency.
3. Connect the hydraulic hoses to the tractor hydraulic couplers so the pump operates with the control lever in the "Lower/Retract" position. The pump can then be turned off in the forward "Float" position. Turning the pump off in "Float" instead of "Neutral" allows the hydraulic system pressure to equalize and prevents the occurrence of damaging pressure spikes.

HYDRAULIC MOTOR SEALS

Hydraulic seal failures are typically caused by high continuous pressure or pressure spikes in the return line. The motor seal is rated for 250 PSI(17.2 bar). Maintaining return line pressures below 100 PSI(6.9 bar) will extend motor seal life. Minimize back pressures in the return line by plumbing an unobstructed return back to the hydraulic reservoir or motor return port. Avoid returning the oil through remote valves, couplers, and long undersized hoses. Consult your tractor dealer for low pressure return options.

Do not install any hydraulic components in series on the return line of the motor.

REGULATING HYDRAULIC FLOW TO MOTOR

Warning: Failure to regulate oil flow may damage hydraulic motor.

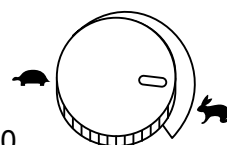
There are three types of hydraulic systems: 1) Load Sensing (LS) also called Pressure-Flow Compensating Closed Center, 2) Pressure Compensating Closed Center (PC), and 3) Open Center (OPEN). Consult the Tractor Hydraulic System Pump Selection Guide(HSG), Internet Hydraulic Selection Guide (IHSG) at www.AcePumps.com, or your tractor dealer to determine the type hydraulic system on your tractor and the method of regulation.

LOAD SENSING CLOSED CENTER SYSTEM

Regulate oil flow with tractor's **FLOW CONTROL**. (Do not use restrictor orifice.)

Setup Instructions:

1. Shut off sprayer boom and agitation valves.
2. Adjust tractor flow control to minimum flow setting (turtle).
3. Move hydraulic lever to "Lower/Retract" position to start pump.
4. Adjust tractor flow control until sprayer shut-off pressure is 4 psi(0.3 bar) for 650 models or 20 psi(1.4 bar) for 750/855 models above desired spraying pressure. **Flow Control**
Do not exceed maximum shown in **SHUT-OFF PRESSURE** section below.
5. Open the sprayer agitation valve to set desired spraying pressure.



SHUT-OFF PRESSURE

Shut-off pressure is the sprayer system pressure with all liquid flow turned off. This means closing the boom, agitation, and any by-pass valves. It is the highest pressure a centrifugal pump will achieve for a given RPM and relates directly to the flow of hydraulic oil. A pressure gauge must be located between the pump discharge and the shut off valves.

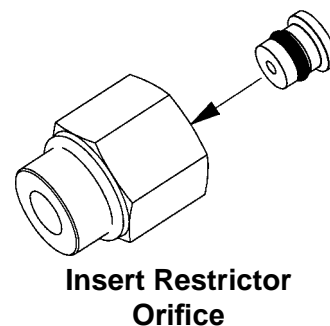
Pump Model	Maximum Shutoff	Pump Model	Maximum Shutoff
FMC-650-HYD	160 psi (11 bar)	FMC-750F-HYD	150 psi (10.3 bar)
FMC-650F-HYD	160 psi (11 bar)	FMC-855F-HYD	150 psi (10.3 bar)
FMCWS-650F-HYD	160 psi (11 bar)		

PRESSURE COMPENSATING CLOSED CENTER SYSTEM

Regulate oil flow by using a **RESTRICTOR ORIFICE**.

Setup Instructions:

1. Install restrictor orifice for all 650 models. Insert the orifice with O-ring inside the adapter/restrictor body in the motor inlet port.
Note: Do not use restrictor for 750 and 855 pump models.
2. Set "Rabbit/Turtle" flow control to "Turtle".
3. Move hydraulic lever to the "Lower/Retract" position to start pump.
4. Adjust "Rabbit /Turtle" flow control and sprayer agitation valve to set desired spraying pressure.



OPEN CENTER SYSTEM

The M Series motors are not equipped with a needle valve to bypass excess oil flow. The tractor hydraulic flow must fall within the motor's recommended flow range or an external bypass circuit may be added. The tractor's hydraulic system may limit pump performance if the oil flow is less than the motor's rated capacity.

Select motor size closest to tractor's hydraulic system capacity.

Consult factory for application of pumps on these systems.

OASISTM

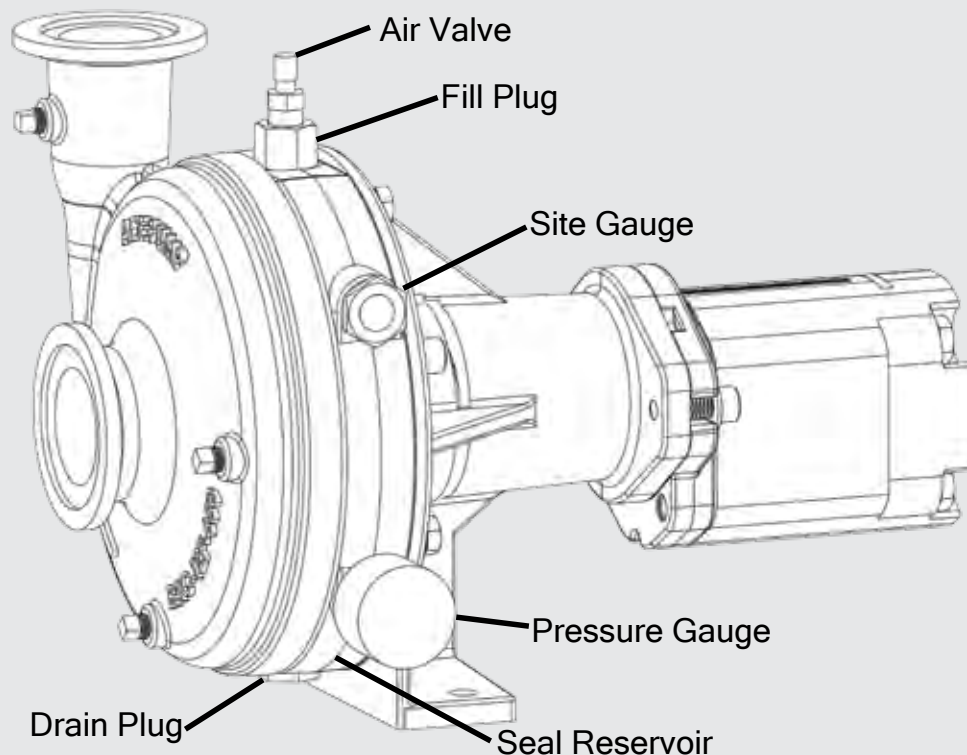
WetSeal Technology

Ace OasisTM Wet Seal Technology prevents the pumped liquid from contacting the shaft seals. The seals operate in a reservoir filled with a specially formulated barrier fluid for seal face lubrication and heat dissipation. Additionally, air pressure is introduced

to prevent pump fluid from contaminating the seal reservoir. This isolation of the seals prevents abrasive wear of the seal faces and run dry seal failures.

The Oasis WetSeal is standard on the FMCWS-650, FMC-750F, and FMC-855F pump models.

All pumps equipped with the OasisTM WetSeal have a two year warranty.



PUMP MAINTENANCE

1. MAX series pumps are equipped with lubricated and sealed bearings. No additional bearing lubrication or maintenance is required.
 2. Neutralize chemicals and flush pump after each use to prevent corrosion.
 3. If a danger of freezing exists, drain all water from the pump casing by removing the lowest volute pipe plug. This will prevent casting breakage due to frozen liquid inside the pump.
- Note: Do not drain the barrier fluid from the seal reservoir on OasisTM WetSeal models.

OASIS™ WETSEAL MAINTENANCE

The seal reservoir fluid level and pressure must be monitored and maintained to ensure proper operation of the WetSeal feature.

How to check seal reservoir fluid level:

View the site gauge window on the side of the seal reservoir. A float is included to easily see fluid level.

If the fluid is not visible, add fluid by following these steps:

- Relieve reservoir air pressure by removing air valve cap and pressing stem.
- Remove fill plug on top of seal reservoir.
- Add barrier fluid (Ace Part #55032 - available in quarts) until level is at top edge of site window.

Caution: Do not overfill.

- Replace fill plug and recharge air pressure per instructions below.

How to check seal reservoir pressure:

The reservoir pressure gauge gives a direct pressure reading. Pressure should remain within the green zone during operation. The recommended cold reservoir pressure is 25 to 30 psi.

Note: Pressure will increase during operation as the fluid is heated.

Steps to pressurize seal reservoir:

- Verify that fill and drain plugs are installed and tight.
- Remove air valve cap.
- Add air until gauge reads 25 to 30 psi. An air supply or tank regulated to 30 psi(2 bar) is best.

Caution: Do not over pressurize. Relieve excess air pressure if necessary.

- Replace air valve cap.

Maintenance Intervals:

Initial Startup: Verify correct reservoir fluid level and pressure prior to startup.

Daily: Check reservoir pressure.

If air must be added regularly, spray soapy water around plugs, seams, and fittings of seal plate to check for leakage. Reseal as needed. If no external leak is found, installation of a seal kit should be scheduled for next machine downtime.

Weekly: Check barrier fluid level. A small amount of barrier fluid will be consumed under normal operating conditions.

If the barrier fluid appears cloudy or discolored in site gauge, drain until fluid runs clear, refill with clean fluid, and recharge pressure. Check again in one week. If fluid is cloudy or discolored again, this is an indication of inboard seal leakage. A seal kit installation should be scheduled for next machine downtime.

Season End: Remove drain plug and drain barrier fluid from the reservoir into a clean bucket.

1) If the fluid is clear: reinstall plug, refill with barrier fluid, and recharge air pressure.

2) If the fluid is cloudy, discolored, or contains water: This could be the indication that a seal leak is developing. Installation of a seal kit is recommended to ensure trouble free operation for the next season.

WINTERIZING AND STORAGE

1. Flush pump thoroughly and neutralize chemicals to prevent corrosion.
2. Fill pump with recreational vehicle antifreeze to protect from corrosion and freezing.
3. If equipped with Oasis™ WetSeal, see Season End maintenance above.
4. If removing hydraulic hoses, insert plugs in motor ports to retain fluid and prevent contamination.



FMC-650-HYD REPAIR

REPAIR KITS & SEALS

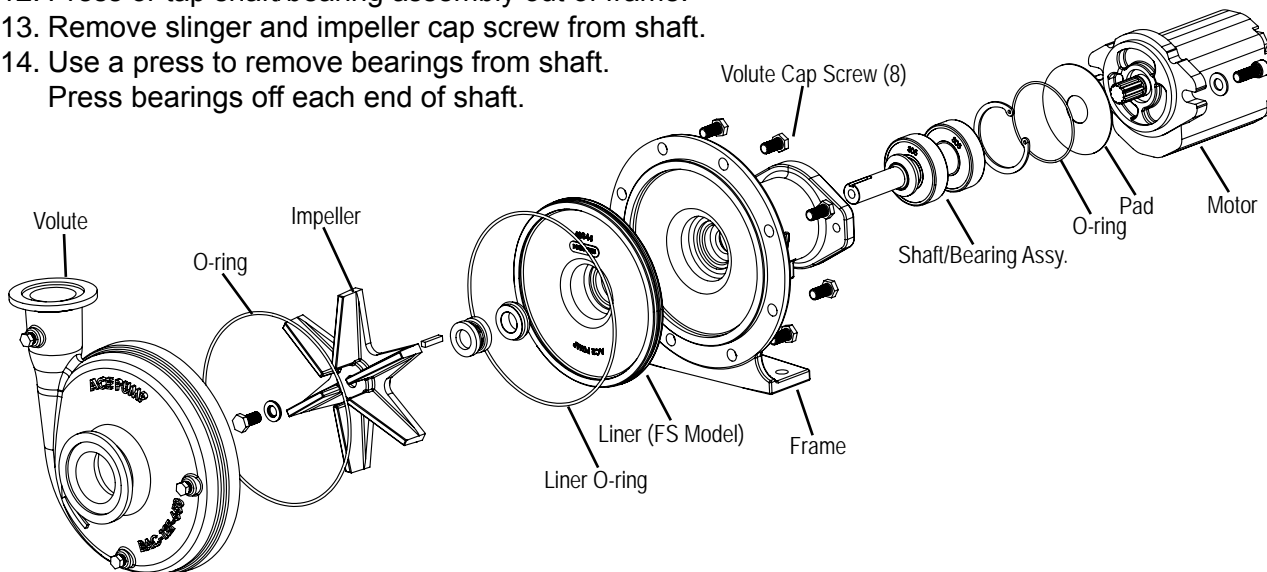
Ace pump repair kits include all shaft seals and O-rings required to repair the pump.

Pump Model	Standard Seal	Severe Duty Seal
FMC-650(F)(FS)-HYD Series	RK-FMC-650	RK-FMCSC-650

Shaft Seal Only	EDP#	Recommended For
BAC-7-650	40145	water and general ag chemicals
BAC-7SC-650	40146	abrasive chemicals and fertilizers
BAC-7-650B	40144	water and aqua ammonia

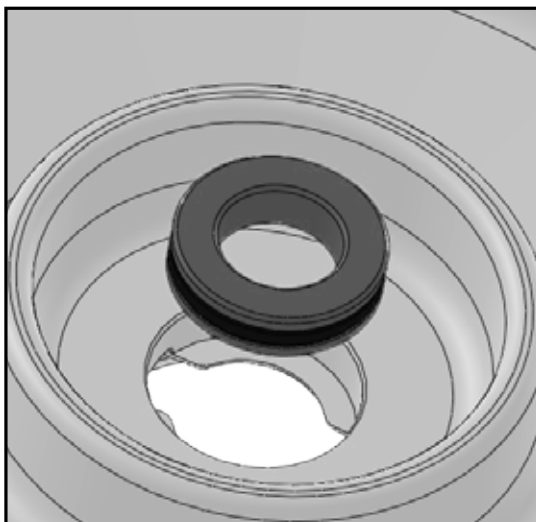
DISASSEMBLY INSTRUCTIONS

1. Remove (2) socket head motor screws and washers with 5/16" hex wrench.
2. Remove hydraulic motor.
Note: Tap with a non-marring hammer if necessary.
Alternate method: a) rotate motor slightly positioning flange ears in front of bolt holes b) install (2) motor screws in motor mount holes from opposite direction and tighten by hand until snug c) tighten screws with wrench using an alternating pattern of one turn each until separated.
3. Remove snap ring from behind rear pump bearing.
4. Remove (8) volute cap screws with 9/16" wrench.
5. Remove volute and O-ring.
6. Remove stainless impeller cap screw with 9/16" socket and discard sealing washer.
Note: Turn counterclockwise to remove
7. Remove impeller and key from shaft.
8. Slide rotating seal assembly with spring off of shaft and discard.
Note: Observe seal orientation for installation of new seal.
9. Install impeller cap screw in shaft end to protect threaded hole.
10. Press or tap (non-marring hammer) shaft/bearing assembly from impeller end until clear of stationary seal face in mounting frame.
11. Use a screw driver to pry stationary seal face from seal bore.
Note: If replacing shaft seal only - skip to Assembly Instructions step 5.
12. Press or tap shaft/bearing assembly out of frame.
13. Remove slinger and impeller cap screw from shaft.
14. Use a press to remove bearings from shaft.
Press bearings off each end of shaft.

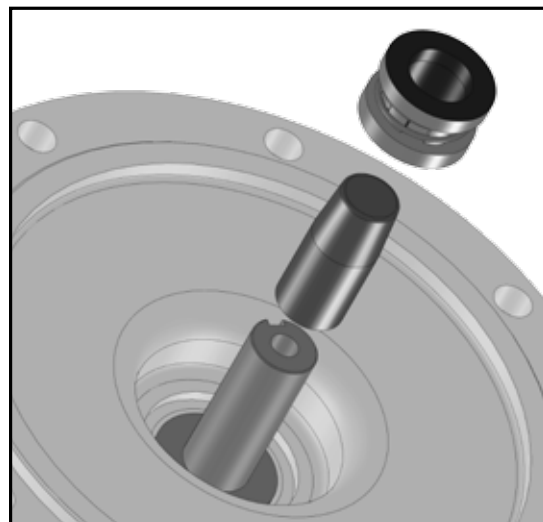


ASSEMBLY INSTRUCTIONS

1. Install front snap ring into mounting frame bearing bore.
2. Press bearings onto shaft. Press one from each end until seated against step on shaft.
3. Install slinger over impeller end of shaft and push to bearing.
4. Set shaft/bearing assembly aside.
5. Stand mounting frame on motor mount flange with seal bore pointing up.
6. Clean and inspect mounting frame seal bore for gouges that may prevent proper sealing.
7. Push stationary seal face into mounting frame seal bore by hand.
Important: Avoid touching seal face by covering it with a soft, clean cloth during installation.
Seal Orientation: Polished seal surface should face up with grooved side towards bearing bore. (See illustration below)
Lubrication: Soapy water may be used on O-ring to aid installation.
8. Press or tap shaft/bearing assembly into mounting frame from motor flange end.
Note: Use a non-marring hammer and soft wood block to prevent shaft or spline damage.
9. Install rear snap ring into mounting frame bearing bore.
10. Place seal installation tool over shaft. Push rotating seal assembly over tool and shaft by hand until black polished face seats against stationary face in mounting frame. Remove seal installation tool. (See illustration below)
Note: Avoid touching the seal face.
Lubrication: Soapy water may be used on rotating assembly bellows, shaft and installation tool to aid installation.
11. Insert key in keyway and apply anti-seize compound to impeller seat area and key.
12. Install impeller on shaft.
13. Install new sealing washer on stainless impeller cap screw and apply nut lock on screw threads.
14. Install impeller cap screw with sealing washer and tighten to 20 ft-lb (27 N-m).
15. Install volute seal O-ring over boss on mounting frame. Stretch O-ring over boss - do not roll.
16. Install volute.
17. Apply nut lock to (8) volute cap screws, install, and tighten to 20 ft-lb (27 N-m). Allow nut lock to cure for a minimum of 10 minutes before filling pump.
18. Apply high speed coupling grease to internal splines of pump shaft.
19. Install O-ring on motor flange boss and position pad over shaft.
20. Install motor aligning shaft splines with pump shaft.
21. Install (2) motor socket head cap screws with washers and tighten to 20 ft-lb (27 N-m).



Step 7



Step 10



FMCWS-650-HYD REPAIR

REPAIR KIT & SEAL

Ace pump Oasis WetSeal repair kits include a dual shaft seal, O-rings, and barrier fluid to refill the seal reservoir.

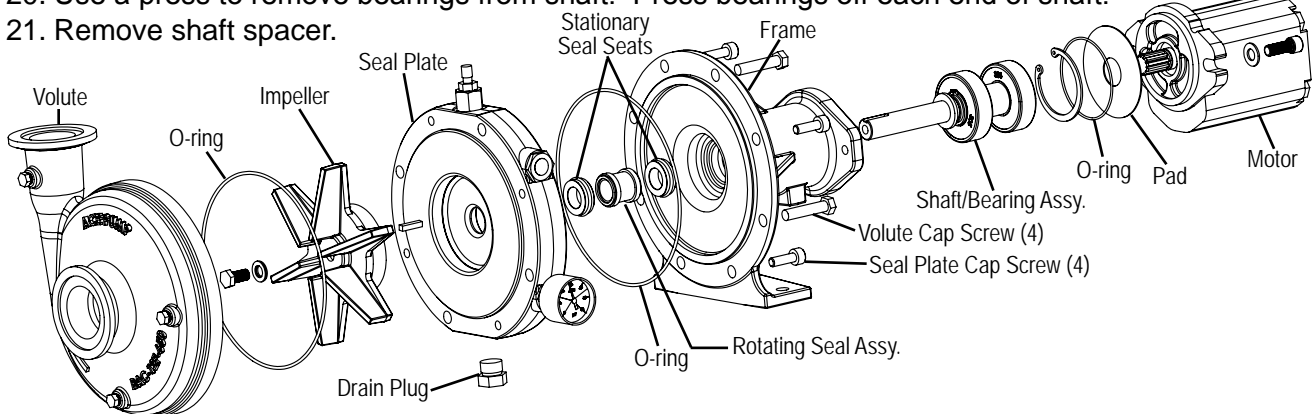
Pump Model	Repair Kit	EDP#
FMCWS-650F(FS)-HYD Series	RK-FMCWS-650	52722

Shaft Seal Only	EDP#	Recommended For
BAC-7-650-WS	40143	all materials and applications



DISASSEMBLY INSTRUCTIONS

1. Mark orientation of volute, seal plate, frame, and motor to assist in reassembly.
2. Remove (2) socket head motor screws and washers with 5/16" hex wrench.
3. Remove hydraulic motor.
Note: Tap with a non-marring hammer if necessary. See page 10 step 2 for alternate method.
4. Remove snap ring from behind rear pump bearing.
5. Remove cap from air fill valve and press stem to release reservoir pressure.
6. Remove hex drain plug with 7/8" wrench and drain barrier fluid into a clean pan.
Note: Recycle or dispose of used fluid the same as motor oil.
7. Remove (4) volute hex head cap screws with 9/16" wrench.
8. Remove volute and O-ring.
9. Remove stainless impeller cap screw with 9/16" socket and discard sealing washer.
Note: Turn counterclockwise to remove
10. Remove impeller and key from shaft.
11. Remove (4) socket head seal plate cap screws with 5/16" hex wrench.
12. Remove seal plate slowly and place shop towel over shaft end for protection. Remove O-ring.
Danger: Compression of seal spring may cause part of seal to fly off without warning.
13. Slide rotating seal assembly ((2) seal faces and (1) spring) off shaft and discard.
14. Install impeller cap screw in shaft end to protect threaded hole.
15. Press or tap (non-marring hammer) shaft/bearing assembly from impeller end until clear of stationary seal face in mounting frame.
16. Use a screw driver to pry stationary seal seats from frame and seal plate.
Note: If replacing shaft seal only - skip to Assembly Instructions step 8.
17. Continue to press or tap shaft/bearing assembly out of frame towards motor end.
18. Remove slinger from shaft.
19. Remove snap ring from shaft on impeller side of front pump bearing.
20. Use a press to remove bearings from shaft. Press bearings off each end of shaft.
21. Remove shaft spacer.



ASSEMBLY INSTRUCTIONS

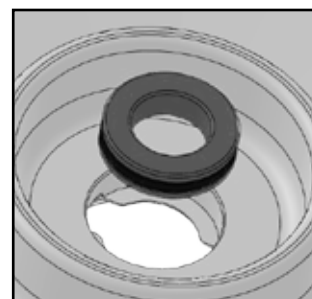
1. Install snap ring on shaft into second groove from impeller end.
2. Press bearing onto shaft from impeller end until seated against snap ring.
3. Install snap ring in groove on opposite side of bearing.
4. Install slinger on shaft over threaded end and push to step on shaft.
5. Place spacer over shaft from splined end and press rear bearing on until seated against spacer.
6. Set aside shaft/bearing assembly.
7. Install front snap ring into mounting frame bearing bore.
8. Clean and inspect seal bores on mounting frame and seal plate. Bore damage or gouges may prevent proper sealing.
9. Install stationary seal seats:

Important: Avoid touching seal faces by covering with a soft, clean cloth.

Lubrication: Lightly oil O-ring with clean barrier fluid to aid installation.

A. Push a seal seat by hand into mounting frame seal bore with grooved side towards bore.

B. Push a seal seat into seal plate seal bore by hand with grooved side towards bore.



Step 9

10. Press or tap shaft/bearing assembly into mounting frame from rear motor flange.
Note: Use a non-marring hammer and soft wood block to prevent shaft or spline damage.
11. Install rear snap ring into mounting frame bearing bore.
12. Stand mounting frame/shaft assembly on motor mount flange with shaft pointing up.
13. Place seal installation tool over shaft and install rotating seal faces:

Important: Avoid touching seal faces.

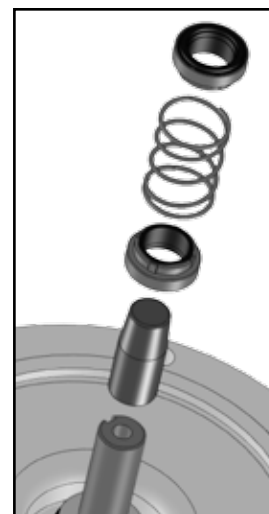
Lubrication: Lightly oil rotating assembly bellows, shaft, and installation tool with clean barrier fluid to aid installation.

A. Push first rotating seal assembly over shaft by hand until black polished face seats against stationary face in mounting frame.

B. Place spring on shaft above first rotating seal assembly.

C. Push second rotating seal assembly over shaft by hand until metal seal cup seats against spring. Polished black seal face should be up towards impeller. Remove seal installation tool.

14. Install seal plate O-ring over boss on mounting frame. Stretch O-ring over boss – do not roll.
15. Install seal plate and tighten (4) socket head cap screws to 20 ft-lb (27 N-m).
16. Insert key in keyway and apply anti-seize compound to impeller seat area and key.



Step 13

17. Install impeller on shaft.
18. Install new sealing washer on stainless impeller cap screw and apply nut lock on screw threads.
19. Install impeller cap screw with sealing washer and tighten to 20 ft-lb (27 N-m).
20. Install volute seal O-ring over boss on seal plate. Stretch O-ring over boss – do not roll.
21. Install volute.
22. Apply nut lock to (4) volute cap screws, install, and tighten to 20 ft-lb (27 N-m). Allow nut lock to cure for a minimum of 10 minutes before filling pump.
23. Apply high speed coupling grease to internal splines of pump shaft.
24. Install O-ring on motor flange boss and position pad over shaft.
25. Install motor aligning shaft splines with pump shaft.
26. Install motor socket head cap screws with washers and tighten to 20 ft-lb (27 N-m).
27. Place pump on a level surface then follow barrier fluid fill and pressurization instructions (page 9).



FMC-750F-HYD REPAIR

REPAIR KIT & SEAL

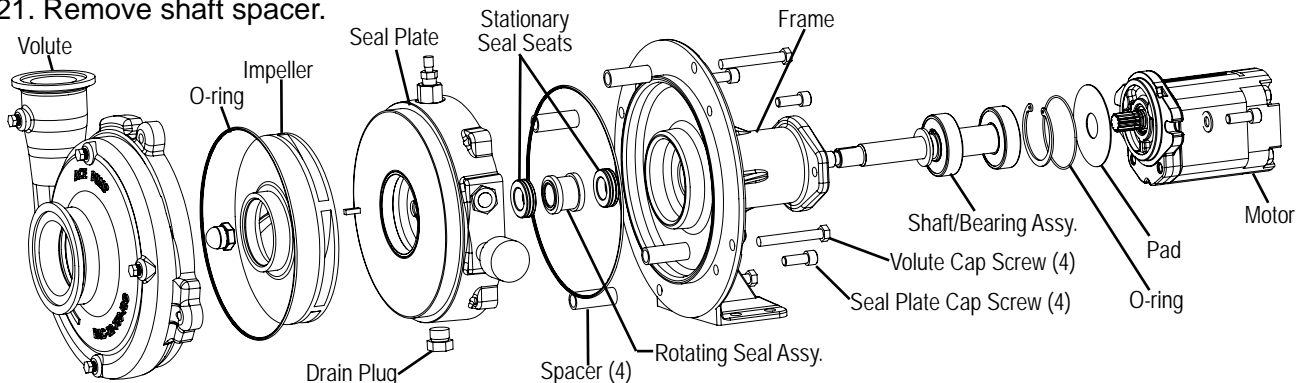
Ace pump Oasis WetSeal repair kits include a dual shaft seal, O-rings, and barrier fluid to refill the seal reservoir.

Pump Model	Repair Kit	EDP#
FMC-750F-HYD Series	RK-FMC-750	52724

Shaft Seal Only	EDP#	Recommended For
BAC-7-750V	40147	all materials and applications

DISASSEMBLY INSTRUCTIONS

1. Mark orientation of volute, seal plate, frame, and motor to assist in reassembly.
2. Remove (2) socket head motor screws and washers with 5/16" hex wrench.
3. Remove hydraulic motor.
Note: Tap with a non-marring hammer if necessary. See page 10 step 2 for alternate method.
4. Remove snap ring from behind rear pump bearing.
5. Remove cap from air fill valve and press stem to release reservoir pressure.
6. Remove hex drain plug with 7/8" wrench and drain barrier fluid into a clean pan.
Note: Recycle or dispose of used fluid the same as motor oil.
7. Remove (4) volute hex head cap screws and spacers with a 9/16" wrench.
8. Remove volute and O-ring.
9. Remove impeller acorn nut with a 1" socket.
Note: Turn counterclockwise to remove. Insert a flat file into an impeller vane to hold stationary.
10. Remove impeller and key from shaft.
11. Remove (4) socket head seal plate cap screws with 5/16" hex wrench.
Note: Two screws were used on early models.
12. Remove seal plate slowly and place shop towel over shaft end for protection. Remove O-ring.
Danger: Compression of seal spring may cause part of seal to fly off without warning.
13. Slide rotating seal assembly ((2) seal faces and (1) spring) off shaft and discard.
14. Install impeller nut on shaft end to protect threads.
15. Press or tap (non-marring hammer) shaft/bearing assembly from impeller end until clear of stationary seal face in mounting frame.
16. Use a screw driver to pry stationary seal seats from frame and seal plate.
Note: If replacing shaft seal only - skip to Assembly Instructions step 8.
17. Continue to press or tap shaft/bearing assembly out of frame towards motor end.
18. Remove slinger from shaft.
19. Remove snap ring from shaft on impeller side of front pump bearing.
20. Use a press to remove bearings from shaft. Press bearings off each end of shaft.
21. Remove shaft spacer.



ASSEMBLY INSTRUCTIONS

1. Install snap ring on shaft into second groove from impeller end.
2. Press bearing onto shaft from threaded end until seated against snap ring.
3. Install snap ring in groove on opposite side of bearing.
4. Install slinger on shaft over threaded end and push to snap ring.
5. Place spacer over shaft from splined end and press rear bearing on until seated against spacer.
6. Set aside shaft/bearing assembly.
7. Install front snap ring into mounting frame bearing bore.
8. Clean and inspect seal bores on mounting frame and seal plate. Bore damage or gouges may prevent proper sealing.
9. Install stationary seal seats:

Important: Avoid touching seal faces by covering with a soft, clean cloth.

Lubrication: Lightly oil O-ring with clean barrier fluid to aid installation.

A. Push a seal seat by hand into mounting frame seal bore with grooved side towards bore.

B. Push a seal seat into seal plate seal bore by hand with grooved side towards bore.

10. Press or tap shaft/bearing assembly into mounting frame from rear motor flange.

Note: Use a non-marring hammer and soft wood block to prevent shaft or spline damage.

11. Install rear snap ring into mounting frame bearing bore.
12. Stand mounting frame/shaft assembly on motor mount flange with shaft pointing up.
13. Install rotating seal faces:

Important: Avoid touching seal faces.

Lubrication: Lightly oil rotating assembly bellows and shaft with barrier fluid to aid installation.

A. Push first rotating seal assembly over shaft by hand until black polished face seats against stationary face in mounting frame.

B. Place spring on shaft above first rotating seal assembly.

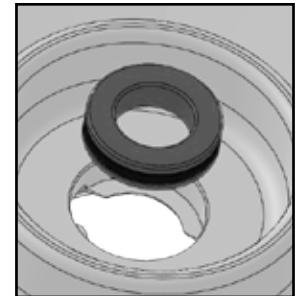
C. Push second rotating seal assembly over shaft by hand until metal seal cup seats against spring. Polished black seal face should be up towards impeller.

14. Install seal plate O-ring over boss on mounting frame. Stretch O-ring over boss – do not roll.
15. Install seal plate and tighten (2) or (4) socket head cap screws to 20 ft-lb (27 N-m).
16. Insert key in keyway and apply anti-seize compound to impeller seat area and key.

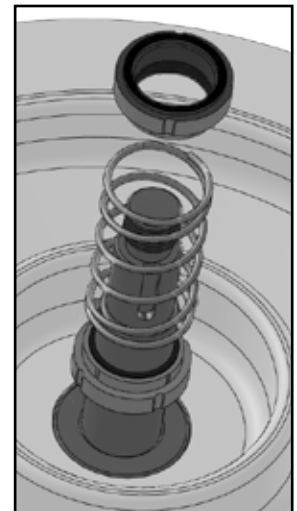
17. Install impeller on shaft and apply nut lock to threaded shaft end.
18. Install acorn nut and tighten to 70 ft-lb (95 N-m).
19. Install volute seal O-ring over boss on seal plate. Stretch O-ring over boss – do not roll.
20. Install volute
21. Apply nut lock to (4) volute cap screws, install, and tighten to 20 ft-lb (27 N-m). Allow nut lock to cure for a minimum of 10 minutes before filling pump.

Note: Place a flat washer under volute cap screw at pump discharge port.

22. Apply high speed coupling grease to internal splines of pump shaft.
23. Install O-ring on motor flange boss and position pad over shaft.
24. Install motor aligning shaft splines with pump shaft.
25. Install motor socket head cap screws with washers and tighten to 20 ft-lb (27 N-m).
26. Place pump on a level surface then follow barrier fluid fill and pressurization instructions(page 9).



Step 9



Step 13



FMC-855F-HYD REPAIR

REPAIR KIT & SEAL

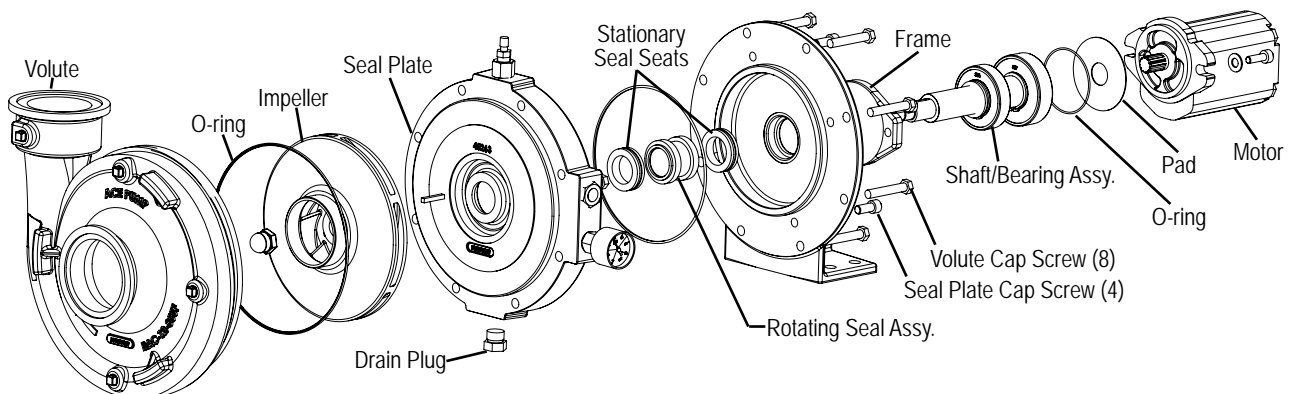
Ace pump Oasis WetSeal repair kits include a dual shaft seal, O-rings, and barrier fluid to refill the seal reservoir.

Pump Model	Repair Kit	EDP#
FMC-855F-HYD Series	RK-FMC-855	52726

Shaft Seal Only	EDP#	Recommended For
BAC-7-850V	40148	all materials and applications

DISASSEMBLY INSTRUCTIONS

1. Mark orientation of volute, seal plate, frame, and motor to assist in reassembly.
2. Remove (2) socket head motor screws and washers with 5/16" hex wrench.
3. Remove hydraulic motor.
Note: Tap with a non-marring hammer if necessary. See page 10 step 2 for alternate method.
4. Remove cap from air fill valve and press stem to release reservoir pressure.
5. Remove hex drain plug with 7/8" wrench and drain barrier fluid into a clean pan.
Note: Recycle or dispose of used fluid the same as motor oil.
6. Remove (8) volute hex head cap screws with a 9/16" wrench.
7. Remove volute and O-ring.
8. Remove impeller acorn nut with a 1" socket.
Note: Turn counterclockwise to remove. Insert a flat file into an impeller vane to hold stationary.
9. Remove impeller and key from shaft.
10. Remove (4) socket head seal plate cap screws with 5/16" hex wrench.
11. Remove seal plate slowly and place shop towel over shaft end for protection. Remove O-ring.
Danger: Compression of seal spring may cause part of seal to fly off without warning.
12. Slide rotating seal assembly ((2) seal faces and (1) spring) off shaft and discard.
13. Install impeller nut on shaft end to protect threads.
14. Press or tap (non-marring hammer) shaft/bearing assembly from impeller end until clear of stationary seal face in mounting frame.
15. Use a screw driver to pry stationary seal seats from frame and seal plate.
Note: If replacing shaft seal only - skip to Assembly Instructions step 8.
16. Continue to press or tap shaft/bearing assembly out of frame towards motor end.
17. Remove slinger from shaft.
18. Remove (2) outer bearing snap rings.
19. Press each bearing off the shaft from center towards the respective end.



ASSEMBLY INSTRUCTIONS

1. Install snap rings on shaft into second and third grooves.
2. Press rear bearing (large) onto shaft from splined end until seated against snap ring.
3. Install snap ring in groove on opposite side of bearing.
4. Press front bearing (small) onto shaft from threaded end until seated against snap ring.
5. Install snap ring in groove on opposite side of bearing.
6. Install slinger on shaft over threaded end and push until 1/4" from front bearing.
7. Set aside shaft/bearing assembly.
8. Clean and inspect seal bores on mounting frame and seal plate. Bore damage or gouges may prevent proper sealing.
9. Install stationary seal seats:

Important: Avoid touching seal faces by covering with a soft, clean cloth.

Lubrication: Lightly oil O-ring with clean barrier fluid to aid installation.

A. Push a seal seat by hand into mounting frame seal bore with grooved side towards bore.

B. Push a seal seat into seal plate seal bore by hand with grooved side towards bore.

10. Press or tap shaft/bearing assembly into mounting frame from rear motor flange.

Note: Use a non-marring hammer and soft wood block to prevent shaft or spline damage.

11. Stand mounting frame/shaft assembly on motor mount flange with shaft pointing up.

12. Install rotating seal faces:

Important: Avoid touching seal faces.

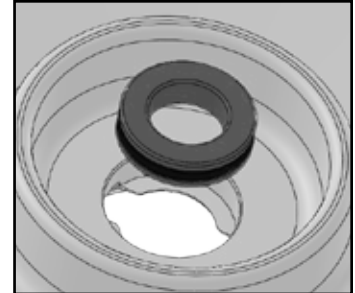
Lubrication: Lightly oil rotating assembly bellows and shaft with barrier fluid to aid installation.

A. Push first rotating seal assembly over shaft by hand until black polished face seats against stationary face in mounting frame.

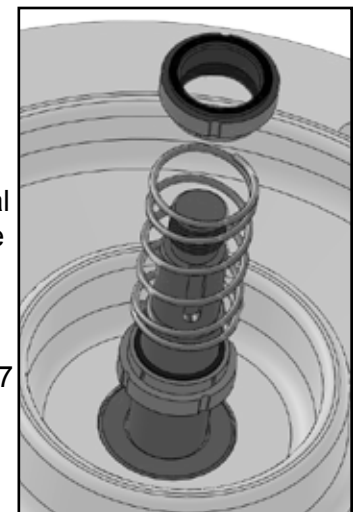
B. Place spring on shaft above first rotating seal assembly.

C. Push second rotating seal assembly over shaft by hand until metal seal cup seats against spring. Polished black seal face should be up towards impeller.

13. Install seal plate O-ring over boss on mounting frame. Stretch O-ring over boss – do not roll.
14. Install seal plate and tighten (4) socket head cap screws to 20 ft-lb (27 N-m).
15. Insert key in keyway and apply anti-seize compound to impeller seat area and key.
16. Install impeller on shaft.
17. Apply nut lock to threaded shaft end.
18. Install acorn nut and tighten to 70 ft-lb (95 N-m).
19. Install volute seal O-ring over boss on seal plate. Stretch O-ring over boss – do not roll.
20. Install volute.
21. Apply nut lock to (8) volute cap screws, install, and tighten to 20 ft-lb (27 N-m). Allow nut lock to cure for a minimum of 10 minutes before filling pump.
22. Install O-ring on motor flange boss and position pad over shaft.
23. Apply high speed coupling grease to internal splines of pump shaft.
24. Install motor aligning shaft splines with pump shaft.
25. Install motor socket head cap screws with washers and tighten to 20 ft-lb (27 N-m).
26. Place pump on a level surface then follow barrier fluid fill and pressurization instructions(page 9).



Step 9



Step 13

HYDRAULIC MOTOR REPAIR KITS

Ace M Series hydraulic motors are high efficiency pressure balanced gear motors. The high efficiency design prevents replacement of some motor parts if damaged. See Ace Form # HYD-M SERIES for a listing of available replacement parts. The most common replacement part is the shaft seal which is listed in the table below for each motor model.

Ace Motor Model	Used on Pump Models	Repair Kit	Ace EDP#
BAC-75-HYD-M16	FMC-650... & FMCWS-650...	RK-BAC-75-M	40138
BAC-75-HYD-M22	FMC-750F...	RK-BAC-75-M	40138
BAC-75-HYD-M25	FMC-750F...	RK-BAC-75-M	40138
BAC-75-HYD-M30	FMC-850F..., FMC-855F..., all -CD	BAC-75-M-FKM	40164

A new motor seal was implemented in June 2015 for the RK-BAC-75-M kit.

Please refer to Ace Pump [Product Update 19](#) for complete details.

A video of the seal replacement process is available here: www.youtube.com/user/acepump

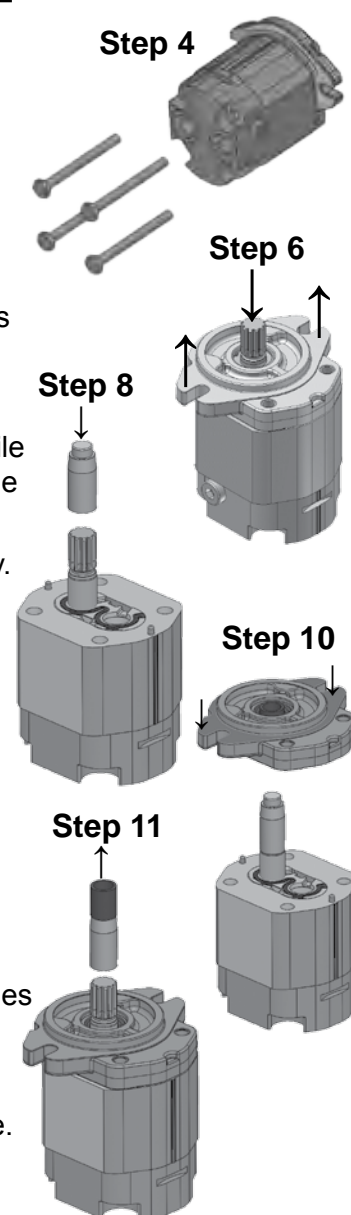
MOTOR SHAFT SEAL REPLACEMENT

DISASSEMBLY:

1. Wipe the motor with a clean cloth to remove dirt which could contaminate the motor.
2. Note port locations then remove hoses and external fittings.
3. Mark the motor section joints to indicate orientation of the motor components.
4. Remove (4) motor assembly cap screws. Motors with hex head cap screws require a 17 mm socket. Motors with socket head cap screws require a 9.5 mm or 3/8" hex key wrench.
5. Set motor on rear cover with shaft pointing up.
6. Remove front motor flange by pressing thumbs against shaft end while pulling up with fingers behind flange ears. Take care to not disturb the other motor components.
7. Remove the housing seal O-ring and discard the old flange assembly. Inspect the motor shaft for grooving or scoring. Moderate to severe damage in the sealing area may prevent proper sealing and require motor replacement.

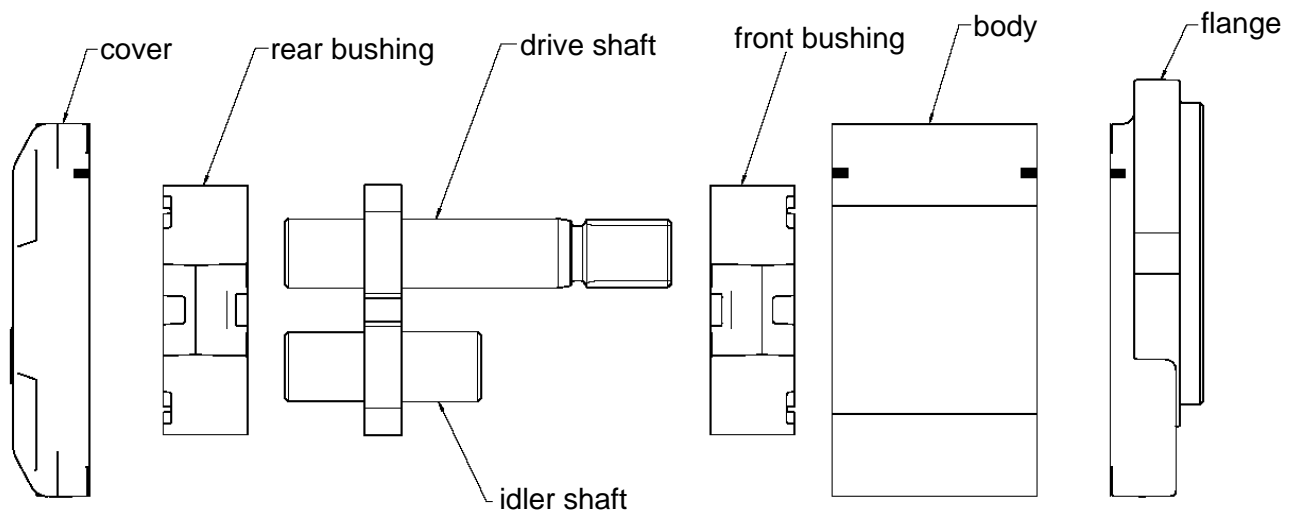
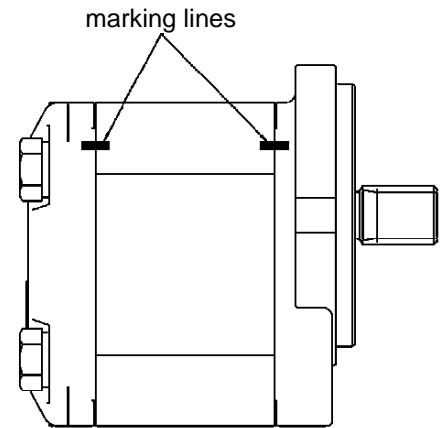
ASSEMBLY: (Note: Do not remove paper tube from seal.)

8. Place seal installation tool over splined shaft end. Lubricate the tool and seal lips with clean oil.
9. Lightly grease housing seal O-ring and place into groove on rear of new flange.
10. Carefully place new flange/seal assembly over installation tool and press down slowly to body. The tool will push the paper tube out.
Note: Take care to hold the flange level and push evenly on both sides of the flange.
11. Discard seal installation tool and paper tube.
12. Reinstall motor assembly bolts and tighten to 33 ft-lb (45 N-m) torque.
Turn the shaft by hand to ensure the motor turns freely.
13. Reinstall external motor fittings.



MOTOR DISASSEMBLY & REASSEMBLY

1. Mark motor prior to disassembly at each section joint as shown in the diagram. These marks will serve as guides to reassemble motor components in original positions.
2. Remove 4 motor assembly bolts. Motors with socket head cap screws require a 9.5 mm or 3/8" hex wrench. Motors with hex head cap screws require a 17mm socket.
3. Take motor apart as shown in diagram below.
Important: Remember orientation and location of all parts. Lay parts on a clean cloth in proper orientation during disassembly.



4. Replace seals, O-rings, and components as needed.
5. Reassemble cover, shafts, bushings, and body in their original positions. Use alignment pins and marked lines for reference.
Note: All components must be reinstalled exactly as they were for proper motor function.
6. Set assembly on back cover with shaft pointing up.
7. Go to step 4 on the previous page for instructions on replacing shaft seal and completing reassembly.

HYDRAULIC MOTOR SEALS

Hydraulic seal failures are typically caused by high continuous pressure or pressure spikes in the return line. The motor seal is rated for 250 PSI(17.2 bar). Maintaining return line pressures below 100 PSI(6.9 bar) will extend motor seal life. Minimize back pressures in the return line by plumbing an unobstructed return back to the hydraulic reservoir or motor return port. Avoid returning the oil through remote valves, couplers, and long undersized hoses. Consult your tractor dealer for low pressure return options.

Do not install any hydraulic components in series on the return line of the motor.

STANDARD WARRANTY

Ace pumps and valves are guaranteed against defects in material and workmanship for a period of one year from date of installation. The warranty period is two years for pumps equipped with Oasis™ WetSeal Technology which requires proper maintenance of the seal chamber by the user as directed in the Instruction Manual. Products or parts found to be defective upon inspection at the factory will be repaired or replaced at our discretion.

Ace Pump Corporation shall not be held liable for damages caused by abuse or misuse of the product or parts. No claim for labor in repairing or replacing such products will be allowed nor will loss of time or inconvenience be considered warranty obligations.

IMPORTANT: Pumps or valves returned for warranty consideration which are tested and found to perform within specifications are subject to an inspection charge.

PLEASE NOTE EXCEPTIONS

All seals are covered against defects in materials or workmanship. Seal failures resulting from application related conditions are not covered. Most seal failures are due to application conditions such as: (1) abrasive solution scratching the polished seal faces; (2) chemical attack on elastomer or glue; (3) thermal shock from running pump dry or improper priming; (4) failure to flush chemical from pump after use.

Repair requests under the above category will not be considered warranty, and current repair and transportation charges will apply.

PROCEDURE

To return a pump, valve, or part for warranty consideration, please call Ace Pump and request a Returned Goods Authorization (RGA) number (800-843-2293). Please request one RGA number for each pump or valve. Provide the part number of the item being returned along with the reason for return. Be specific when describing the nature of the defect. Include this information in the box along with a customer contact name, phone number, and return address. Ship pump prepaid freight. Package pump in original packaging or similar to prevent damage in shipment. Warranty determinations will be made after the product has been received and inspected.

This warranty is in lieu of all other warranties, express or implied, and Ace Pump Corporation does not authorize any other person to assume for it any obligation or liability in connection with the sale of said pumps, valves, or any parts thereof.

WARNING: Pumps returned to Ace must be free of chemical hazard. Chemicals must be neutralized and thoroughly rinsed. Pumps with indications of active chemical will not be considered for repair or warranty.