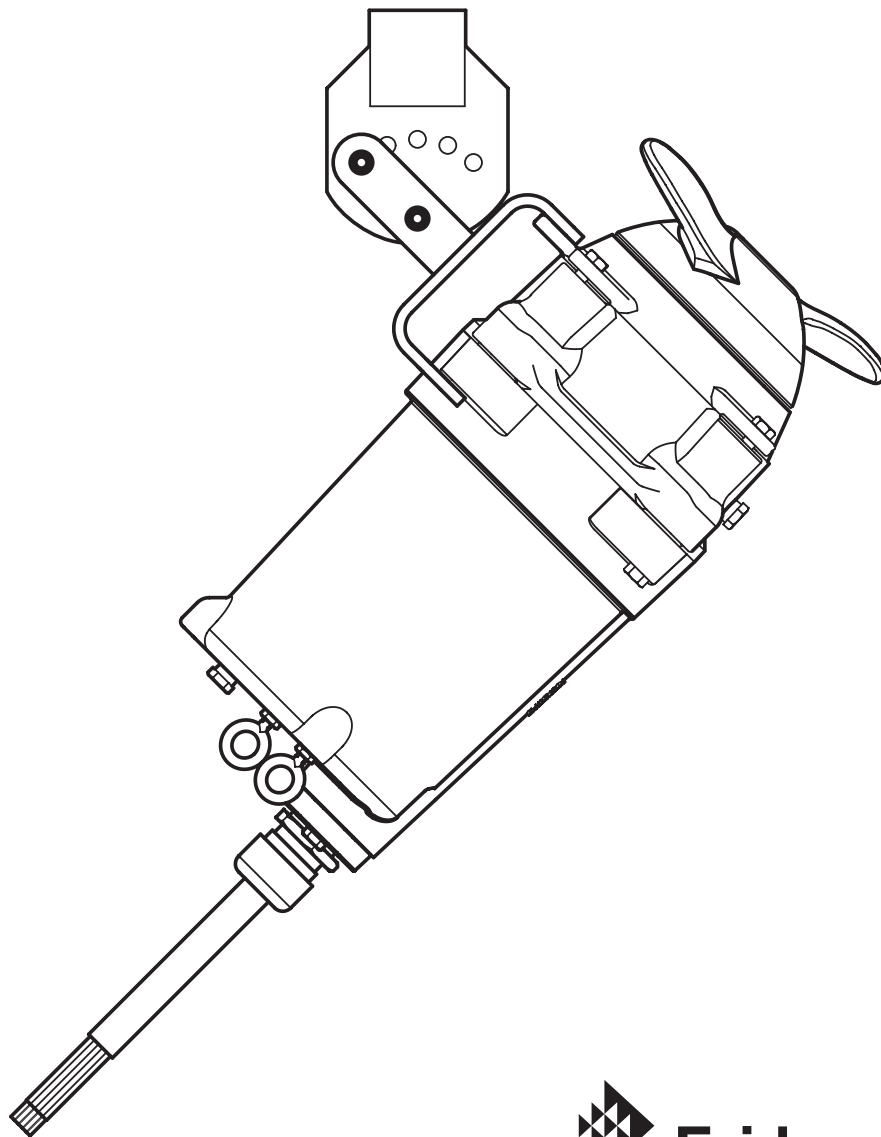


# Fairbanks Morse Pump

## FBM20 SUBMERSIBLE BASIN MIXER

### Instruction & Repair Manual



**INSTRUCTION MANUAL  
FBM20 SUBMERSIBLE BASIN MIXER****General Information:**

Thank you for purchasing your Fairbanks Morse product. To help ensure years of trouble-free operation, please read the following manual carefully.

**WARNING – Only qualified personnel shall install or service this product.**

**Before Operation:**

Read the following instructions carefully. Reasonable care and safe methods should be practiced. Check the local codes and requirements before installation.

**Attention:**

This manual contains important information for the safe use of this product. Read this manual completely before using this product and refer to it often for continued safe product use. **DO NOT THROW AWAY THIS MANUAL.** Keep it in a safe place so that you may refer to it often.

**WARNING – Before handling electrical equipment, always disconnect the power first. Do not smoke or use sparkable electrical devices or flames in a septic (gaseous) or possible septic sump.**

**Cautions and Warnings:**

**CAUTION –** To reduce risk of electrical shock, disconnect power before servicing this product.

**WARNING –** See installation and service manual for proper installation.

**WARNING –** To reduce risk of electrical shock, mixer is provided with grounding wire. Be certain that it is connected to ground.

**WARNING –** Hazardous moving parts. To reduce the risk of injury, disconnect power before servicing the product.

**CAUTION –** To reduce risk of electrical shock, DO NOT remove cord or strain relief. DO NOT connect conduit to mixer. Electrical installations shall be in accordance with the National Electrical Code and all applicable local codes and ordinances.

For use with maximum 140°F water.

Septic tank should be vented in accordance with local plumbing codes and should not be installed in locations classified as hazardous, in accordance with the National Electrical Code, ANSI/NFPA 70-1999.

**CAUTION –** Risk of electrical shock. Do not remove cord and strain relief.

**WARNING –** Severe injury may result from accidental contact with moving propeller. Keep clothing, hands and feet away from propeller any time power is connected to the mixer.

**CAUTION –** Never work on mixer with power on. Make sure that the ground wire is securely connected and that the unit is properly grounded in accordance with local codes.

## The Mixer:

### DESCRIPTION

The Fairbanks Morse product covered by these instructions is a submersible basin mixer.

The integral stainless steel motor shaft is sealed by two mechanical seals with an oil chamber between the seals to provide lubrication for both seal faces.

Two ball bearings are used to handle the loads. The upper bearing takes radial load, while the larger lower bearing handles both thrust and radial loads. Both bearings are permanently lubricated by the dielectric oil in the motor housing. The motor is fixed within the motor housing and is completely submerged in the dielectric oil for maximum heat transfer. The motor housing and seal chamber are completely sealed with O-rings located at mating part faces.

The power cord entry system is designed to give double sealing. The chamfered pilot of the motor housing mates with the molded cord end to form the first seal. The cord grip forms the second seal around the molded cord end and provides strain relief. The cable includes the leads for both heat sensors (motor protection) and the seal sensor lead for seal leakage detection.

### APPLICATION

The submersible basin mixer is used to break up crusts and solids that float at the top of a solids-handling basin. The unit can also be used for mixing and stirring applications in industrial areas and waste management facilities.

### RECEIVING MIXER

Inspect mixer on arrival for possible concealed damage in shipping. Any damage should be reported immediately to delivering carrier. Claims for damage must originate at the receiving end. Claims for shipping damage cannot be processed at the factory.

### CODES

All local wiring codes must be observed. Consult the local inspector before installation to avoid costly delays that can occur due to rejection after job is finished.

## Mixer Installation:

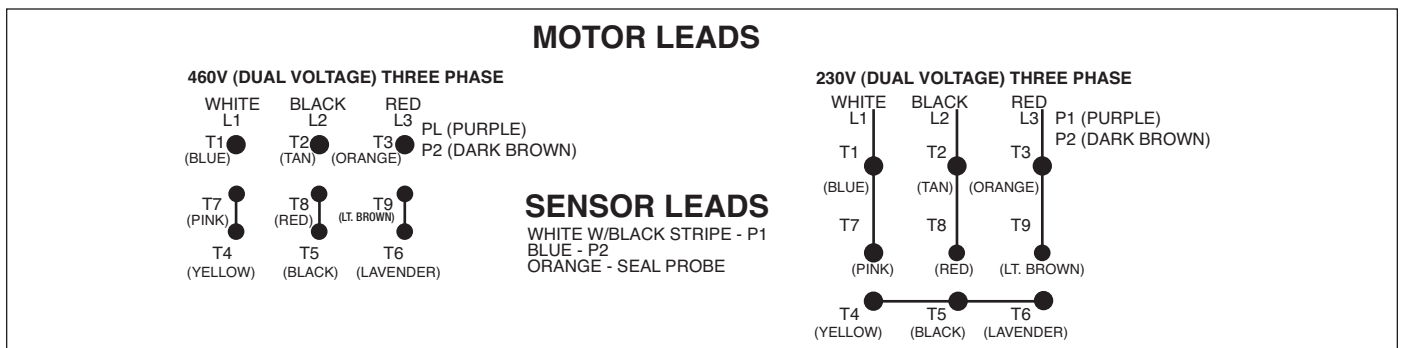
### UNPACKING

Remove from carton. When unpacking unit, check for concealed damage. Claims for damage must be made at the receiving end through the delivery carrier. Damage cannot be processed from the factory.

### LOCATION

If mixers are installed in an existing basin or concrete sump, they may either be connected permanently or rails and brackets can be furnished for mounting to walls of basin. The complete factory built packaged system is recommended for the most satisfactory installation and generally for the lowest cost where expensive installation labor is involved.

### ELECTRICAL CONNECTIONS



Make all connections from motor to control panel to comply with local codes.

**CAUTION** – Make sure that the ground wire is securely connected and that the unit is properly grounded in accordance with local codes.

### Mixer Operations:

**WARNING** – Severe injury may result from accidental contact with moving propeller. Keep clothing, hands and feet away from propeller any time power is connected to the unit.

#### STARTING THE MIXER

To start the mixer, perform the following steps in order:

1. If mixer is three phase, the rotation of the propeller must first be checked. Lift mixer from sump, lay it down, and quickly turn on and then off.

The propeller should turn counterclockwise when viewed from the suction. If rotation is wrong, turn off main breaker and interchange any two line leads to motor to correct rotation. If mixer is single phase, no rotation check is necessary.

2. After installing mixer in basin in desired location, run water into basin until mixer is covered.
3. Turn mixer on and observe mixing action at the surface of the water. If required, adjust position of mixer mounting brackets until desired mixing action is achieved in the basin.
4. If problems occur, check the power source. Make sure a separate supply line is available. Verify the voltage supply.

### Mixer Maintenance:

#### DISASSEMBLY, INSPECTION, REASSEMBLY

1. Turn off circuit breaker.

**CAUTION** – Never work on mixer with power on. Make sure that the ground wire is securely connected and that the unit is properly grounded in accordance with local codes.

2. Remove mixer from sump.

#### REPLACING SEALS

1. Drain the oil in the seal chamber by removing the drain plug on the side of the unit. If it contains water, the lower seal has failed and should be replaced. The motor housing should be drained and the upper seal replaced if the lower seal has failed, since foreign material in the seal chamber may have damaged the upper seal.
2. Remove the propeller after first removing center set screw at the end of the motor shaft.
3. Using a pair of snap ring pliers, remove the snap ring that secures the lower seal. Remove the lower seal rotating elements by sliding the spring off the shaft. Then, using two screwdrivers, slide the carbon assembly off by prying on the retaining ring.
4. Loosen and remove the cap screws that hold on the seal housing, then remove the seal housing. Using a socket that will fit onto the back of the seal, tap the stationary seal assembly out of the seal housing.

5. Using a pair of snap ring pliers, remove the snap ring that secures the upper seal. Remove the spring retainer and spring from the shaft and, using the same method as used for the lower seal, remove the carbon seal assembly.
6. With a pair of screwdrivers, pry up on the seal/bearing plate. Remove the seal/bearing plate until you have access to the seal sensor wire, then carefully pull the seal sensor wire off the seal probe which will allow the complete removal of the seal/bearing plate.
7. Take a socket and tap out the stationary portion of the seal from the seal/bearing plate in the same manner as used for the lower stationary seal.
8. After checking both of the O-rings, replace the seal bearing plate in the motor housing, making sure that the seal sensor wire has been reattached to the seal probe. Use O-ring lube to prevent cutting in assembly.
9. Take the stationary portion of the new seal and lube the rubber material with a good quality dielectric oil. Press the stationary portion of the new seal into the seal/bearing plate.

**CAUTION** – Do not reuse old seal parts. Replace all parts with new. Mixing old and new parts could cause immediate seal failure.

10. Using a good quality dielectric oil, lube the rubber material on the carbon seal assembly and press it on the shaft. Place the spring and the seal retainer on the shaft as removed. Replace the snap ring.
11. Carefully place the seal housing onto the seal bearing plate, replace the cap screws, and tighten evenly.
12. Using a pressure gauge with a fill stem, pressurize the motor housing to no more than 7 psi with dried air and check for leaks. If after several minutes the gauge reads the same, the seal is good and you can continue with assembly.

NOTE: It is normal to observe some air bubbles in the seal area initially as the seal seats. If the bubbles do not stop within a few seconds, the seal is either not properly installed or is damaged.

13. Following the same procedure outlined in steps 9 through 12, install the lower seal assembly. Replace the impeller using a removable locking adhesive.
14. Reassemble the propeller set screw onto mixer.
15. Refill all chambers with a good quality dielectric oil. Fill the motor housing so that the tops of the motor windings have been covered (2500 ml), but leave an air gap to allow for expansion of the oil. Fill the seal chamber with 700 ml of oil so that an air gap also exists.

## REPLACING MOTOR STATOR

1. If the replacement of the stator is necessary, first follow the disassembly steps outlined in the previous sections of the manual.
2. Remove the shaft rotor assembly from the motor housing, making note that a wave washer is used on the top of the upper bearing.
3. Place motor housing vertically on the bench and remove the cord grip. Carefully remove the power cord from the unit, making sure that the wires are not damaged. Clip the power cable leads, taking note of the wire connections, and then remove the power cable.
4. Turn the motor housing over and remove the stator bolts from the stator, then remove the stator from the motor housing.

5. Place new stator into the motor housing while pulling the new leads through the power cord opening in the motor housing. Replace the stator bolts and tighten. Replace the seal sensor wire along the side of the stator.
6. Attach the power cord to the stator leads and the sensor leads using insulated butt connector. Once attached, carefully tuck the wires into the motor housing, making sure they will not come in contact with the rotor. Press the power cord molded end into chamber in the motor housing.
7. Apply a sealant to the threads on the body of the cord grip that will enter the motor housing, then slide onto the power cord and tighten snugly. DO NOT OVERTIGHTEN. Attach the cord grip nut onto the cord grip and snug.
8. Examine the bearings on the shaft/rotor assembly. If they feel rough when rotated, replace. When reinstalling new bearings, press only on the inner ring of the bearing or damage may occur.
9. Replace the wave washer into the upper bearing pocket in the motor housing, then reinstall the rotor and shaft assembly.
10. Follow the previously outlined steps to reassemble the mixer from this point.
11. Always run mixer for a few seconds after assembly work to be sure all parts run smoothly before replacing it in the sump. Check again for correct rotation. Mixer should rotate counterclockwise when viewed from the propeller end.

NOTE: When applying power, be sure the mixer is restrained from turning by holding the unit at the motor housing, or by clamping it in a holding fixture.

**WARNING** – Severe injury may result from accidental contact with moving propeller. Keep clothing, hands and feet away from propeller any time power is connected to the mixer.

## Mixer Troubleshooting

Below is a list of troubles and their probable causes:

### Insufficient mixing

1. Mixer orientation needs adjusted
2. Wrong rotation
3. Speed too low

### Mixer overloads motor

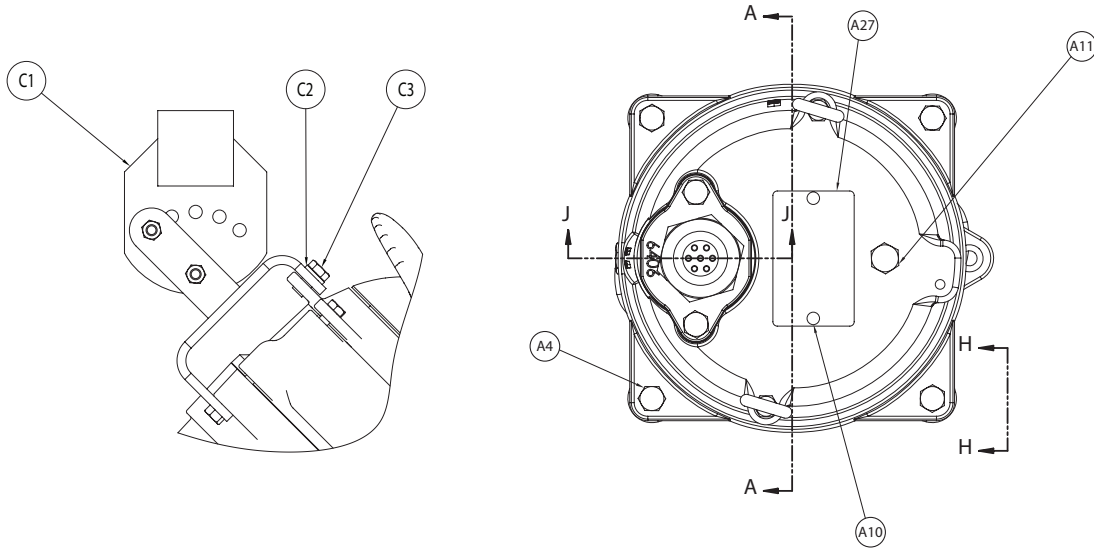
1. Wrong rotation
2. Specific gravity or viscosity of liquid too high
3. Speed too high
4. Mixer clogged
5. Defective bearings

### Mixer is noisy

1. Defective bearings
2. No axial clearance between propeller and seal housing

If the cause of the trouble cannot be determined and corrected as outlined above, contact your nearest factory representative.



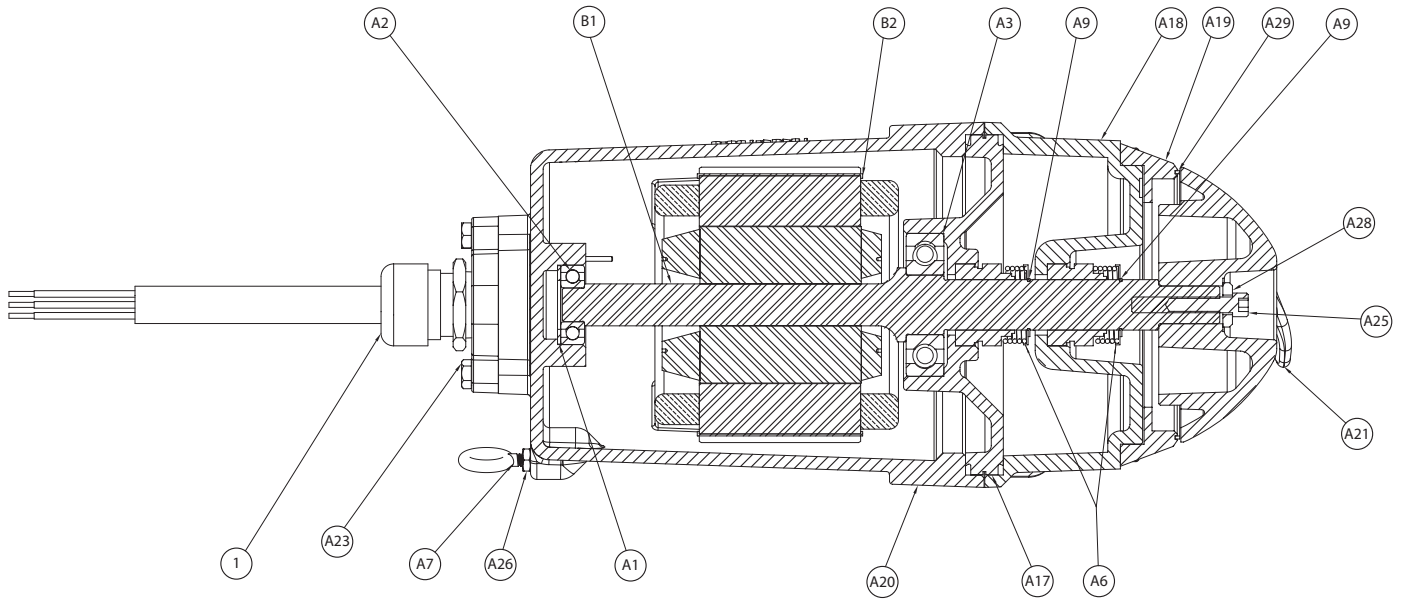


Ref No.	Part No.	Part Description	Qty.
1	14424-011-5	CORD ASSEMBLY	1
A1	00064-001-1	SPRING – BEARING ADJ.	1
A2	00065-001-1	BEARING – BALL (UPPER)	1
A3	00065-027-1	BEARING-BALL (LOWER)	1
A4	00101-011-1	SCREW – HHC 5/16-18 x 1-3/4	4
A5	00150-042-1	O-RING 1/8 DIA. 5.359 I.D.	1
A6	00300-000-1	SEAL – SHAFT 1"	2
A7	00589-010-1	BOLT – EYE 1/4-20	2
A8	00834-015-1	O-RING 3/32 DIA. 1.737 I.D.	1
A9	00975-002-1	RING – RETAINING	2
A10	04580-001-1	SCREW – DRIVE #6	2
A11	05022A092	PLUG – PIPE 1/4	2
A12	05876A120	O-RING 1/8 DIA. 6-1/4 I.D.	2
A13	06000-014-1	WIRE W/TERMINAL 14 GA RED	1
A14	08472-001-5	SEAL FAILURE ASSEMBLY	1
A15	13424-010-1	LABEL	1

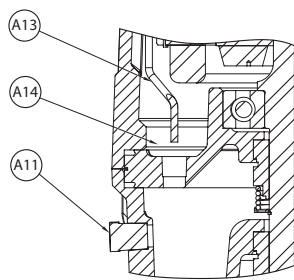
Ref No.	Part No.	Part Description	Qty.
A16	13424-011-1	LABEL – WARNING	1
A17	13488-000-2	PLATE/BEARING SEAL	1
A18	13489-001-2	HOUSING – SEAL	1
A19	13489-300-2	HOUSING – LIP SEAL	1
A20	13494-100-2	HOUSING – MOTOR	1
A21	15212-000-2	PROPELLER – MIXER	1
A22	15222-000-1	SEAL – LIP 4"	1
A23	19100A004	SCREW – CAP 5/16 SST x 3/4	2
A24	19100A029	SCREW – CAP 5/16 SST x 1	4
A25	00178-004-1	SCREW – CAP 5/16 SST x 1	1
A26	19109A077	NUT – HEX 1/4	2
A27	27688A050	NAMEPLATE	1
A28	00519-000-1	WASHER	1
A29	27755A000	TEFLON RING SEAL	1
A30	00145-029-1	STATOR BOLT, 1750 RPM (NOT SHOWN)	4
	00145-010-1	STATOR BOLT, 1150 RPM (NOT SHOWN)	4

Ref No.	Part No.	Part Description	Qty.
B1	15215-011-1	ROTOR & SHAFT 1750 RPM	1
	15223-011-1	ROTOR & SHAFT 1150 RPM	1
B2	15215-003-1	STATOR 1750 RPM	1
	15223-003-1	STATOR 1150 RPM	1
C1	526033035	BRACKET – LOWER MIXER	1
C2	05454A015	WASHER – LOCK SST 3/8	1
C3	19101A003	SCREW – CAP 3/8-16	1

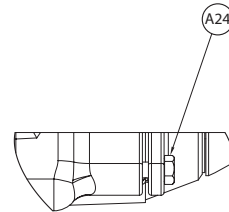
FAIRBANKS MORSE RESERVES THE RIGHT TO SUBSTITUTE MATERIALS WITHOUT NOTICE.



SECTION A-A



SECTION J-J



SECTION H-H





# WARRANTY

**DELIVERY:** Buyer agrees to inspect all deliveries immediately. Any claim for shortages must be made in writing within ten (10) days after Buyer receives a shipment, and if not made, shall be deemed waived. Any other claim by Buyer, other than claims under the warranty stated in Paragraph 13, shall be made within thirty (30) days after Buyer receives shipment, and if not made shall be deemed waived. Seller is not responsible for loss or damage in transit after having received an "In Good Order" receipt from the carrier. Buyer will make all claims for loss or damage in transit against the carrier. Buyer is fully responsible for (including payment of the cost of) installation and start-up of all equipment sold under the Order.

**PATENT INFRINGEMENT:** Seller will defend Buyer and the user of the equipment against any claim that any equipment and parts of Seller's manufacture furnished under the Order infringe upon any published United States patent, and Seller will pay damages and costs awarded by a court of competent jurisdiction with respect to such claim. The Buyer or user must promptly notify Seller of any such claim, and cooperate fully with Seller in the defense of such claim, or Seller will have no duty under this paragraph. Buyer will defend and indemnify Seller against patent infringement claims relating to equipment and parts that are not manufactured by Seller to the same extent as Seller agrees to defend and indemnify Buyer with respect to patent infringement claims relating to equipment and parts of Seller's manufacture.

**WARRANTY:** Seller warrants equipment (and its component parts) of its own manufacture against defects in materials and workmanship under normal use and service for one (1) year from the date of installation or start-up, or for eighteen (18) months after the date of shipment, whichever occurs first. Seller does not warrant accessories or components that are not manufactured by Seller however, to the extent possible, Seller agrees to assign to Buyer its rights under the original manufacturer's warranty, without recourse to Seller. Buyer must give Seller notice in writing of any alleged defect covered by this warranty (together with all identifying details, including the serial number, the type of equipment, and the date of purchase) within thirty (30) days of the discovery of such defect during the warranty period. No claim made more than 30 days after the expiration of the warranty shall be valid.

Guarantees of performance and warranties are based on the use of original equipment manufactured (OEM) replacement parts. Fairbanks Morse Pump Corporation assumes no responsibility or liability if alterations, non-authorized design modifications and/or non-OEM replacement parts are incorporated.

If requested by Seller, any equipment (or its component parts) must be promptly returned to Seller prior to any attempted repair, or sent to an authorized service station designated by Seller, and Buyer shall prepay all shipping expenses. Seller shall not be liable for any loss or damage to goods in transit, nor will any warranty claim be valid unless the returned goods are received intact and undamaged as a result of shipment. Repaired or replaced material returned to customer will be shipped F.O.B., Seller's factory. Seller will not give Buyer credit for parts or equipment returned to Seller, and will not accept delivery of any such parts or equipment, unless Buyer has obtained Seller's approval in writing.

The warranty extends to repaired or replaced parts of Seller's manufacture for ninety (90) days or for the remainder of the original warranty period applicable to the equipment or parts being repaired or replaced. This warranty applies to the repaired or replaced part and is not extended to the product or any other component of the product being repaired.

Repair parts of its own manufacture sold after the original warranty period are warranted for a period of one (1) year from shipment against defects in materials and workmanship under normal use and service. This warranty applies to the replacement part only and is not extended to the product or any other component of the product being repaired.

Seller may substitute new equipment or improve part(s) of any equipment judged defective without further liability. All repairs or services performed by Seller, which are not covered by this warranty, will be charged in accordance with Seller's standard prices then in effect.

**THIS WARRANTY IS THE SOLE WARRANTY OF SELLER AND SELLER HEREBY EXPRESSLY DISCLAIMS AND BUYER WAIVES ALL OTHER WARRANTIES EXPRESSED, IMPLIED IN LAW OR IMPLIED IN FACT, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** Seller's sole obligation under this warranty shall be, at its option, to repair or replace any equipment (or its component parts) which has a defect covered by this warranty, or to refund the purchase price of such equipment or part. Under the terms of this warranty, Seller shall not be liable for (a) consequential, collateral, special or liquidated losses or damages; (b) equipment conditions caused by normal wear and tear, abnormal conditions of use, accident, neglect, or misuse of said equipment; (c) the expense of, and loss or damage caused by, repairs or alterations made by anyone other than the Seller; (d) damage caused by abrasive materials, chemicals, scale deposits, corrosion, lightning, improper voltage, mishandling, or other similar conditions; (e) any loss, damage, or expense relating to or resulting from installation, removal or reinstallation of equipment; (f) any labor costs or charges incurred in repairing or replacing defective equipment or parts, including the cost of reinstalling parts that are repaired or replaced by Seller; (g) any expense of shipment of equipment or repaired or replacement parts; or (h) any other loss, damage or expense of any nature.

**CONDITION TO WARRANTY WORK:** If Buyer is in default (including, but not limited to, the failure of Buyer to maintain a current account with Seller) under the Order or any other agreement between Buyer and Seller, Buyer's rights under the warranty shall be suspended and the original warranty period will not be extended.

**PERFORMANCE:** Equipment performance is not warranted or guaranteed unless separately agreed to by Seller in accordance with its guarantee policy. Performance curves and other information submitted to Buyer are approximate and no warranty or guarantee shall be deemed to arise as a result of such submittal. All testing shall be done in accordance with Seller's standard policy.

**LIABILITY LIMITATIONS:** Under no circumstances shall the Seller have any liability under the Order or otherwise for liquidated damages or for collateral, consequential or special damages or for loss of profits, or for actual losses or for loss of production or progress of construction, regardless of the cause of such damages or losses. In any event, Seller's aggregate total liability under the Order or otherwise shall not exceed the contract price. Buyer agrees to indemnify and hold harmless Seller from all claims by third parties in excess of these limitations.

**COMPLIANCE WITH LAW:** Since the compliance with the various Federal, State, and Local laws and regulations concerning occupational health and safety and pollution are affected by the use, installation and operation of the equipment and other matters over which Seller has no control, Seller assumes no responsibility for compliance with those laws and regulations, whether by way of indemnity, warranty, or otherwise.



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