



"THE WATER'S EDGE"

8100-04 Paseo, Kansas City, Missouri 64131

**INSTALLATION
OPERATION
AND
MAINTENANCE
OF THE
INTER-MIX
DIRECT DRIVE
MAST MOUNTED MIXERS**

2/1/09

DO NOT DESTROY! SUPPLY TO OWNER/OPERATOR

This manual is designed for use in the installation, operation and maintenance of the Inter-Mix Direct Drive Mast Mounted Mixer. Store this document in an easily accessible and dry location.

The following information is provided to alert persons to potential personal hazards inherent with electrical/mechanical products.

! DANGER: Indicates an eminently hazardous situation which, if not avoided, will result in death or serious injury.

! WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

! CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



SAFETY DATA INFORMATION SHEET

! WARNING: DISCONNECT AND LOCK OUT ELECTRICAL POWER BEFORE ANY SERVICE IS PERFORMED ON THIS DEVICE.

! WARNING: THE CONTROL PANEL AND UNIT MUST BE GROUNDED. FAILURE TO CONNECT TO A PROPER GROUND COULD RESULT IN PERSONAL INJURY OR DEATH.

! WARNING: BEFORE ATTEMPTING TO INSTALL, SERVICE OR MAINTAIN THE UNIT IN ANY BODY OF WATER; A COAST GUARD APPROVED (PFD, TYPE III OR HIGHER) PERSONAL FLOTATION DEVICE MUST BE WORN.

! WARNING: ATTEMPTING TO INSTALL OR SERVICE EQUIPMENT FROM AN UNSTABLE WORK PLATFORM COULD RESULT IN DEATH OR INJURY.

! WARNING: POSSIBLE CUTTING HAZARD. ROTATING PROPELLER COULD RESULT IN SERIOUS INJURY. TURN OFF POWER AND LOCK OUT BEFORE INSTALLATION OR SERVICING.

! CAUTION: INSTALLATION OR SERVICE WORK MUST BE PERFORMED FROM A STABLE WORK PLATFORM TO AVOID THE POSSIBILITY OF CAPSIZING.

INSTALLATION PRECAUTIONS

Safety Precautions

In order to minimize the risk of accidents in connection with the service and install work, the following rules should be followed:

1. Never work alone. Use a lifting harness, safety line and respirator, as required. Do not ignore the risk of drowning.
2. Make sure that there is sufficient oxygen and that there are no poisonous gases present.
3. Check the explosion risk before welding or using electric hand tools.
4. Do not ignore health hazards. Observe strict cleanliness.
5. Bear in mind the risk of electrical accidents.
6. Make sure that the lifting equipment is in good condition.
7. Provide a suitable barrier around the work area – for example, a guard rail.
8. Make sure you have a clear path to retreat!
9. Use safety helmet, safety goggles, protective shoes and a P.F.D. (personal flotation device).
10. All personnel who work with sewage systems should be vaccinated against diseases that can occur.

Follow all other health and safety rules and local codes and ordinances.

Handling Equipment

!WARNING: Equipment is heavy and cumbersome. Other sources of moving and lifting equipment into place; i.e., crane, are advisable, but safety precautions should be followed for personnel and equipment. **Keep out from under suspended loads.**

Damage due to installation is not the responsibility of Air-O-Lator Corporation.

Storage of Equipment

Indoor storage is preferred. Keep all skids and cartons together. Outside storage will not damage the equipment.

!CAUTION: Power cord should be protected from water at open end to prevent irreversible moisture damage to power cord.

During winter months or when temperatures go below freezing, damage to equipment can occur due to water freezing and expansion.

Inter-Mix Direct Drive Mixer Assembly

Components – Typical mixer assembly consists of the following major parts:

Mixer
Motor Mount
Mast
Upper Mast Support
Base Plate
Jib Boom

Installation (Review engineering plans for proper location)

1. Support Structure Installation

- A. Set the upper mast support into the desired position.
- B. Position support to maintain critical clearance required for mixer to pass the walkway or other protrusions.
- C. Position the support using a spirit level (grout may be used, as required).
- D. Mark and set anchor bolts.

Use Chem-Stud anchors (supplied) for concrete installation.
Follow manufacturer's instructions.

Stainless bolts, or welding to affix support structure, must meet engineer's approval.

2. Base Plate Installation

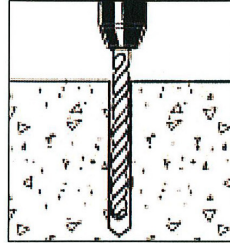
- A. Hang plumb line from upper mast support at center of split half (represents center line of mast).
- B. Position base plate under upper support with plumb line in center of base plate.
- C. Mark and set the Chem-Stud anchors. Follow manufacturer's instructions.
- D. Grout to level and support base plate.

3. Mast Installation

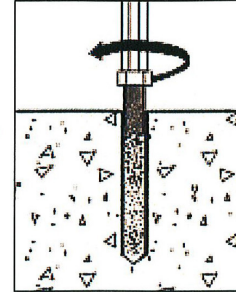
- A. Position mast with socket end onto pivot ball that is welded to base plate.
- B. Place top of mast into upper support Azimuth clamp.
- C. Install front Azimuth clamp with hardware provided. **DO NOT TIGHTEN.**
- D. Insert Azimuth clutch plates (2) around mast into upper mast support clamp.
- E. Position the mast with the safety stop facing outward.
- F. Tighten bolts (finger tight) on clamp to allow rotation of mast.

INSTALLATION GUIDELINES

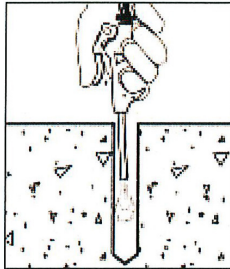
Drill a hole to the size and embedment required. The tolerances of the drill bit used should meet the requirements of ANSI B212.15.



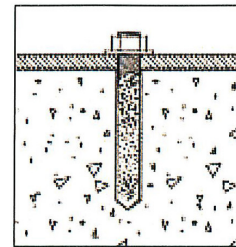
Select the drive unit, insert it into a rotary hammer drill and engage the coupling to be used. Insert the chisel point of the rod or rebar into the hole to break the glass capsule. Spin it into the capsule at a speed of 250 to 500 RPM until it is fully embedded.



Starting from the bottom or back of the anchor hole, blow clean with compressed air, brush the hole with a nylon brush, and blow it clean again. Vacuuming only is not sufficient. Blow out bulbs generally do not provide enough dust removal for most drilled anchor holes. Holes should be clean and sound. Anchor holes may be dry or damp, but should be free of standing water or frost. If using reinforcing bar, be sure the bar will fit into the drilled hole. If a larger hole is required, the diameter should be as close as possible to the diameter of the reinforcing bar. Prior to installing check the capsule to be sure it is not damaged and invert several times at 60°F or above to confirm all of the resin is in a liquid state. Insert the capsule into the hole. Either end of the capsule may be inserted first.

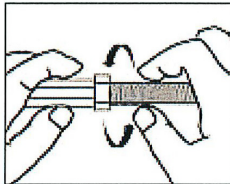


Once the rod or bar is fully embedded, turn the rotary hammer drill off immediately. If installing threaded rod, pull the driver out of the coupling while holding the rod. Hold the hex nut with a wrench to unthread the coupler. If using reinforcing bar, release the set lever and slide the coupler off the bar.



Allow the adhesive to cure for the specified time prior to applying any load. Do not disturb or load the anchor until it is fully cured.

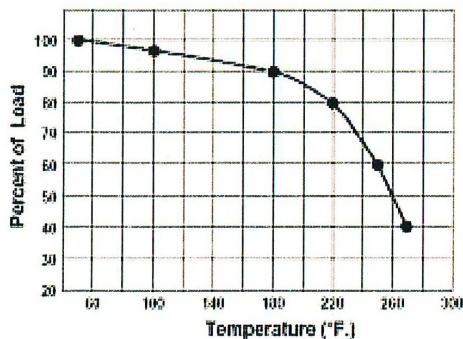
Thread the nut onto the anchor rod leaving 3 to 4 threads exposed. Then thread the rod coupler onto the threaded rod until it is tight against the nut. If using reinforcing bar, insert the bar into the proper size coupler. The threaded rod or reinforcing bar used should be free of dirt, grease, oil, or other foreign material.



ADHESIVES

In-Service Temperature

Allowable tension and shear load bond strength reduction based on in-service temperature for the Chem-Stud capsule adhesive.



Temperature Conversion		
Degree Fahrenheit (°F)	Degree Celsius (°C)	Percent Allowable Load (%)
50	10	100
100	38	97
180	82	90
220	104	80
250	121	60
270	132	40

4. Jib Boom Installation

- A. Place jib boom over mast with jib extension facing outward (same side of mast with safety stop).
- B. Install winch assembly.
- C. Feed the cable over boom rollers and clamp end to winch.
- D. Leave other end free to connect to mixer lifting bar.

5. Mixer Installation

- A. Set the mixer next to the upper mast support.
- B. Rotate the mast assembly to position the jib boom over the mixer.
- C. Insert loose end of cable connected to jib boom to the lifting bar on the mixer. Secure, using clips and thimble (provided).
- D. Use the winch to remove slack from cable, and lift mixer. Insure that the mixer lifts in a balanced position. If not, change location where cable is connected to the lifting bar.
- E. Rotate the mast assembly and mixer until the mixer is over the basin.
- F. Insert plastic liner into position while pulling the mixer into position on the mast.
- G. Insert the back two (2) roller bolts and roller bushings.
- H. Secure the two (2) roller bolts with nylon lock nuts provided. Do not over tighten, as this will prevent mixer from raising and lowering properly.

6. Positioning Mixer

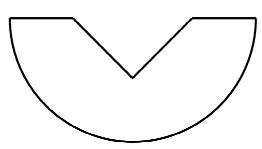
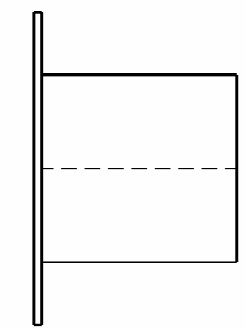
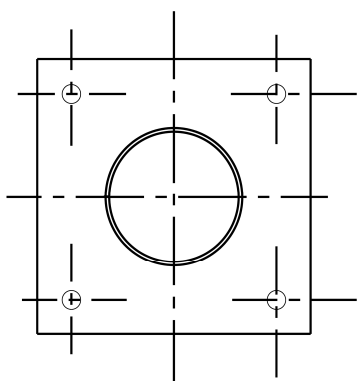
- A. Lower the mixer to the bottom stop.
- B. Rotate mast to desired position.
- C. Tighten the four (4) clamp bolts on the Azimuth clamp. Refer to bolt torque values sheet.

7. Positioning Power Cable

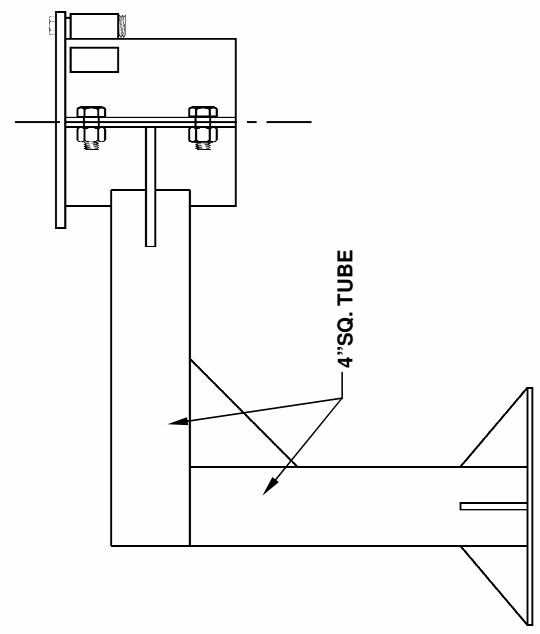
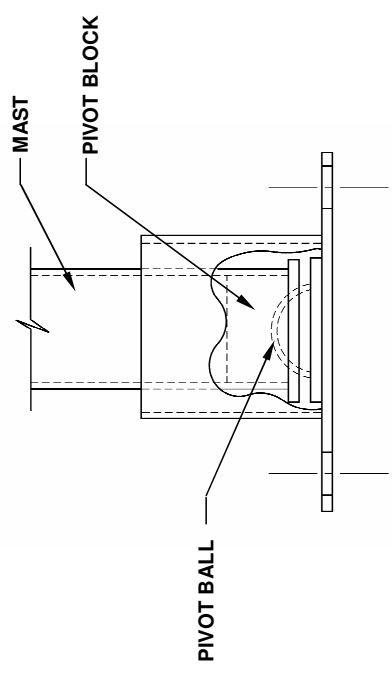
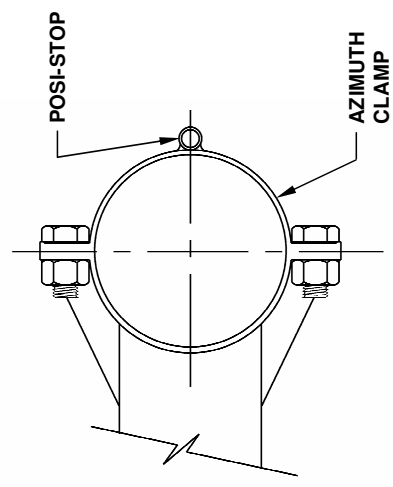
- A. The power cable must be properly suspended to eliminate any possible contact with the mixer's propeller.
- B. Position the cable so that it does not have any sharp bends and is not pinched.


DO NOT RAISE THE MIXER WHILE IT IS OPERATING.

BE SURE POWER CABLE DOES NOT COME IN CONTACT WITH PROPELLER AND SECURE, BEFORE STARTING MIXER.



ALUMINUM CLUTCH PLATE TYP.(2)



	AIR-O-LATOR 8100 PASEO KANSAS CITY, MISSOURI PHONE (816) 363-4242			DATE 9-23-08
Typical Mast Supports				D01001

BOLT TORQUE VALUES

Suggested Max Torquing Values – a guide based upon Harper Test on dry products wiped clean.
Values thru 1" diameter are stated in inch pounds; over 1 inch diameter, in foot pounds.

Bolt Size	18-8 SS	Brass	316 SS
Values are	stated in	Inch Lbs.	
1/4"	75.2	61.5	78.8
5/16"	132	107	138
3/8"	236	192	247
7/16"	376	317	393
1/2"	517	422	542
9/16"	682	558	713
5/8"	1110	907	1160
3/4"	1490	1220	1558
7/8"	2318	1895	2420
1"	3110	2545	3250
Values are	stated in	Foot Lbs.	
1-1/8"	390	318	408
1-1/4"	480	394	504
1-1/2"	703	575	732

OPERATION

When the submersible mixer leaves the factory it is ready for installation. No adjustment, venting or oil filling is required. For THREE PHASE motors, the only connection to the motor lead cable is the power supply, for SINGLE PHASE, the motor lead cable and power supply must be properly connected at the single phase control box. Motor will operate successfully with frequency not more than 5% and voltage not more than 10% above or below nameplate data. Performance within the percentage range above will not necessarily be the same as the nameplate performance at exact rated voltage and frequency.

1. Counter Clockwise (CW) is the correct direction of the propeller rotation when viewed from the propeller end of the mixer. To reverse direction of a THREE PHASE motor, interchange any two motor leads at the starter. To reverse direction of rotation of a SINGLE PHASE motor, the proper connections must be made in the motor connection chamber; refer to the wiring diagrams supplied in the motor connection chamber and control box.

2. Power Check

Check motor name plate against specifications to insure that phase, voltage, horsepower and cycles are correct and according to the engineer's requirements. Make note of name plate amperage to be checked after start up.

3. Electrical Connections

- A. Motor Operation Connections

The unit is designed to protect all power connections against moisture. All mixers have a lead connection chamber. THREE PHASE dual voltage motors have 9 motor leads and SINGLE PHASE dual voltage motors have 8 motor leads. All submersible pump motors have 2 thermal protector leads, and some have optional moisture sensing probe leads (2). See project specifications for determination.

Leads are tagged for easy identification. A connection diagram is provided in the lead chamber. Motors can be connected for either high or low voltages.

The motor lead cable assembly for all submersible motors has 3 marked power leads plus one ground lead, and two thermal leads.

Leads are brought through a sealed connector providing a mechanically strong water tight seal. The cap and cable assembly are available as a replacement part assembly. When replacing the lead wire cap, care should be taken not to nick to damage the "O" ring seal. Replace any damaged or nicked "O" rings.

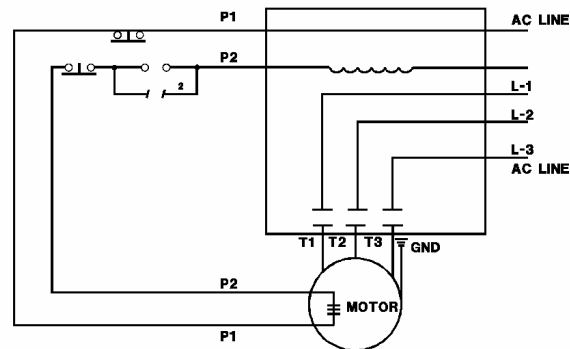
B. Thermal Protection

The motors are equipped with thermal protection devices. This section deals with proper connection of those devices.

Thermostat leads marked P1 and P2 should be connected in series with the stop button of the 3-wire pilot circuit of the magnetic motor controller, so that the thermostat will open the circuit before dangerous temperatures are reached.

If current through the thermostat will exceed the values listed below, an intermediate control circuit relay must be used to reduce the current or the thermostat will not work properly.

VOLTS	CONTINUOUS AMPERES	INRUSH AMPERES
110- 120	3.0	20
220- 240	1.5	15
440- 480	0.75	7.5
550- 600	0.6	6.0



P1 & P2 Normally Closed Thermostat Leads
(normally open thermostats are not acceptable to UL)

- (1) Starter Holding Coil
- (2) Holding Coil Contacts – N.O.

!WARNING: MOTOR CONTROLLER MAY HAVE AUTOMATIC OR MANUAL OVERLOAD RESET. DISCONNECT ALL POWER LEADS TO MOTOR WHEN PERFORMING ANY WORK ON MOTOR OR DRIVEN EQUIPMENT.

A MANUAL, MOMENTARY START SWITCH IS RECOMMENDED TO PREVENT AUTOMATIC RESTART OF MOTOR WHEN THERMOSTAT RESETS.

C. Dual Moisture Sensing Probes (If Applicable)

Dual moisture sensing probes are provided and extend into the oil chamber located between the tandem mechanical seals. Should the outer seal fail, water will enter the oil chamber through the labyrinth slinger paths and create a water/oil emulsion in the oil chamber. The moisture detection control system applies 500 vac to the moisture probes and 6va with short circuited electrode circuit. The presence of water in the oil chamber increases the conductivity sufficiently to increase a current flow through the probe circuit which illuminates a warning light and activates a relay to de-energize the motor.

Unlike some designs, the Baldor Reliance motor employs two moisture detection probes in order to have a totally positive system. Some moisture detection systems employ only one probe and rely on the motor housing for a return path. Such a system may encounter high resistance in the return path. This approach is not acceptable to Underwriters Laboratories. Refer to diagrams on pages 12 through 15 in this manual.



Warrick® Series 2800 Seal Leakage Detector Installation and Operation Bulletin

This bulletin should be used by experienced personnel as a guide to the installation of Series 2800 controls. Selection or installation of equipment should always be accompanied by competent technical assistance. We encourage you to contact Gems Sensors Inc. or its representative if further information is required.

Specifications

Contact Design: 2PST and 3PST bridge type double break in all possible combinations of normally open and normally closed. Fully enclosed. Buttons are 1/4 inch diameter silver cadmium oxide.

Contact Rating: 16A @ 115 VAC, 8A @ 230VAC, 1 H.P. @ 115, 230 VAC

Mode of Operation: Direct only. Contacts assume normal position with open circuit.

Supply Voltage: 115, 230, 406 or 575 VAC models: +10% - 15%, 50/60 Hz

Supply Current: Relay energized 4.4 VA

Secondary Circuit: 500 VAC on probes, 6 VA with short circuited electrode circuit

Sensitivity: 20K Ohms/cm (150' maximum distance between control and probes).

Temperature: -40° to 150°, ambient

Terminals: Size 8 pan head screws with wire clamping plate for use with captivated wires or a maximum of 1-#12 AWG/2-#14 AWG uncaptivated wires. Numbered 1 to 10 for identification. Located on front of control assembly for accessibility.

Listings: UL limit control recognized (353) on open type controls only.

General

The Type 2800 is a conductance-actuated control for detection of moisture in the oil chamber of a submersible motor. It is used as a warning device to indicate a seal leakage and to signal the need for preventative maintenance.

Installation

Mount the control or enclosure vertically on wall or other solid structure, with the transformer on the left-hand side. Wire Series 2800 as indicated on drawing. Terminals on the control are numbered and are in the same relative position as shown on the wiring diagram. Terminal pair 1 and 2 must be continuously energized from an AC supply line of electrical characteristics shown on the data plate. Contacts 3-4, 5-6 and 7-8 are available for load duty and, if required, must be wired in series with the load device(s) and load. Terminals 9 and 10 connect to the moisture sensing probes in the motor marked W1 and W2 via cable provided with the motor.

Caution: Probe Sensing circuit, terminals 9 and 10, have 500 VAC, 12mA. This high voltage has minimal amperage, but can cause significant shocking.

Operation

Normally the oil surrounding the probes is nonconductive and the control will be de-energized. An influx of moisture past the outer seal and into the oil reservoir will change the conductivity of the oil and cause the relay to energize. **Note that the moisture may not cause this change in conductivity until motor is running and the moisture becomes emulsified**

Operation (Cont.)

with the oil. Load contacts 3-4, 5-6 and 7-8 will change from their normally open or normally closed position when the control energizes.

Test Procedure

A normally closed push-button and neon indicating lamp are provided as part of the control for testing the moisture sensing components. The motor manufacturer has provided a 330,000-ohm resistor across the probes inside the motor to complete the test. When the test push-button is depressed, the neon indicating lamp will be illuminated to indicate:

- A. Power is supplied to the control
- B. The control is operative
- C. Wiring to the moisture-sensing probes in the motor are intact

This check does not simulate a seal leakage.

To simulate a seal leakage the following test should be done. Caution: Voltage will be present at all terminals on the control when this test is being made:

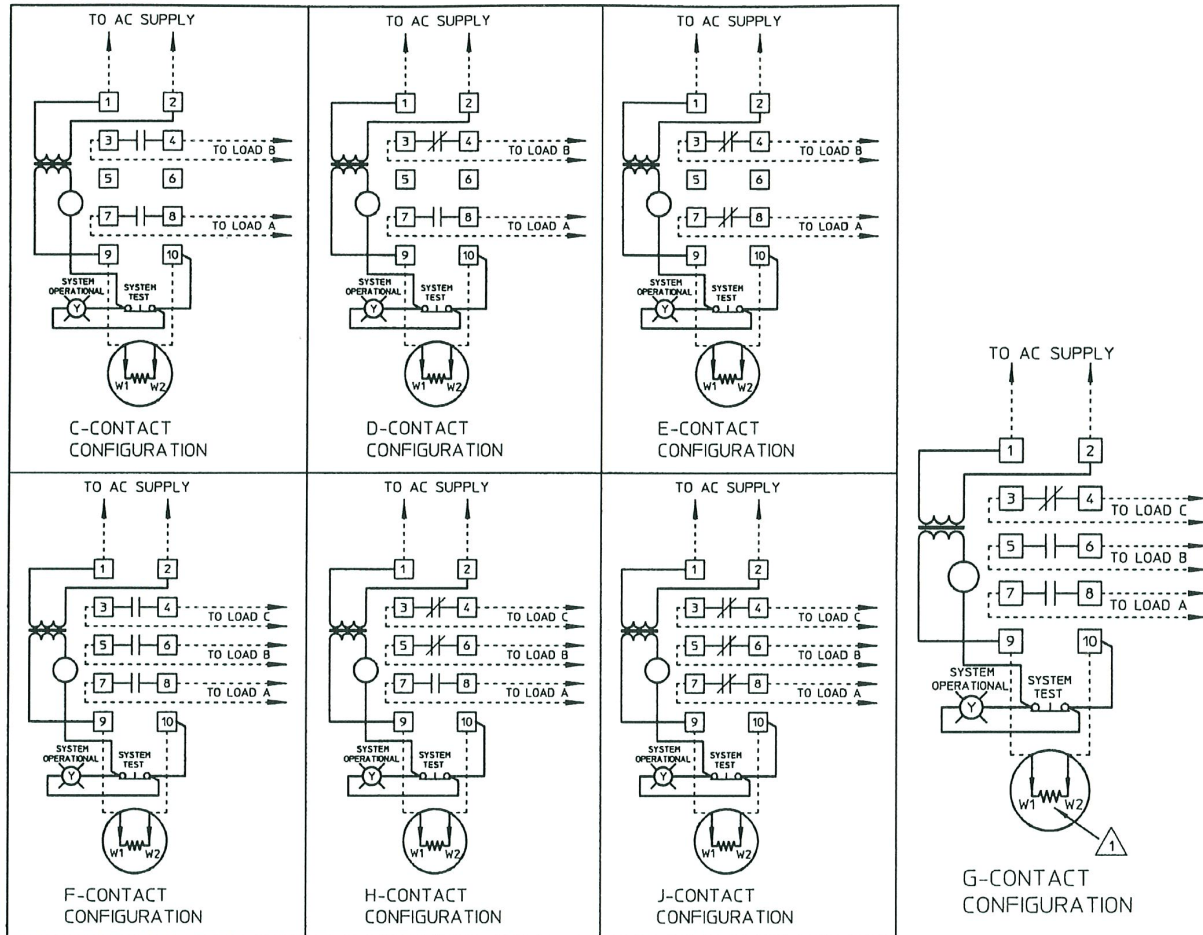
Remove the enclosure cover and momentarily place an insulated jumper (or 20K ohm resistor) across terminals 9 and 10 on the control. The control should energize, simulating a leak condition.

Wire control per drawing, following NEC and local codes. Use appropriately sized spade terminals when wiring.

Ordering Information

	Model	2800	X	X	X	Moisture Detectors
Basic Model of Moisture Relays						
Supply Voltage						
1) 115 VAC						
2) 230 VAC						
4) 460 VAC						
5) 575 VAC						
Contact Configuration						
C) 2 N.O. & 0 N.C.						
D) 1 N.O. & 1 N.C.						
E) 0 N.O. & 2 N.C.						
F) 3 N.O. & 0 N.C.						
G) 2 N.O. & 1 N.C.						
H) 1 N.O. & 2 N.C.						
J) 0 N.O. & 3 N.C.						
Enclosure Type						
0) Open - No Enclosure						
1) NEMA 1						
4) NEMA 4						

Wiring Diagrams



Notes:

1. Resistor internal to the submersible motor (330K ohms)
2. Dashed lines represent field connections
3. Open version only is UL recognized (UL 353 File: MP1430)

WARRICK SERIES 2800 SEAL LEAKAGE DETECTOR **INSTALLATION AND OPERATING INSTRUCTIONS FOR MOISTURE PROBE**

GENERAL:

The type 2800 is a conductance actuated control for detecting moisture in the oil chamber of a submersible pump motor. It is used as a warning device to indicate a seal leakage and to signal the need for preventative maintenance when connected to a signaling device, i.e. a light or horn.

INSTALLATION:

Mount the 2800 control box vertically on wall or other solid structure and accomplish all indicated wiring. Terminals on the control are numbered and are in the same relative position as shown on the wiring diagram. Terminal pair 1-2 must be continuously energized from an A.C. supply line of electrical characteristics shown on the data plate. Contacts 3-4, 5-6 and 7-8 are available for load duty, and if required, must be wired in series with the load device or devices, and that series branch circuit connected across a power source compatible with the load. Terminals 9-10 are connected to the moisture sensing probes in the motor marked W1-W2 via the cable provided with the motor.

OPERATION:

Normally the oil surrounding the probes is nonconductive and the control will be de-energized. An influx of moisture past the outer seal and into the oil reservoir will change the conductivity of the oil and this condition will cause the relay to energize. Load contacts 3-4, 5-6, and 7-8 will change from their normally open or normally closed position when the control energizes.

TEST PROCEDURE:

A normally closed pushbutton and neon indicating lamp are provided as a part of the control for testing the moisture sensing components. The motor manufacturer has provided a 330,000 ohm resistor across the probes inside the motor to complete the test. When the test pushbutton is depressed, the neon indicating lamp will be illuminated to indicate:

- A. Power is supplied to the control
- B. The control is operative
- C. The wiring to the moisture sensing probes in the motor is intact

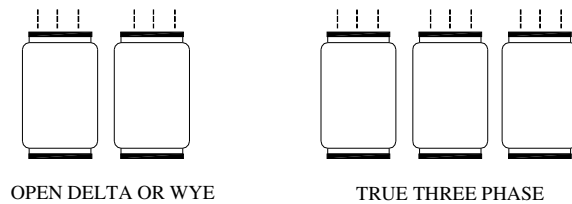
This check does not simulate a seal leakage. An additional check can be made by removing the enclosure cover and momentarily placing a jumper (or 20,000 ohm resistor) across terminals 9-10 on the control. This will energize the control, and test out the neon indicating lamp and associated voltage dropping resistor across terminal 2 and 4.

!WARNING: HIGH VOLTAGE WILL BE PRESENT AT ALL TERMINALS ON THE CONTROL WHEN THIS TEST IS BEING MADE.

PRE-INSTALLATION POWER REQUIREMENTS

Prior to installation, the power company should be notified of the motor data, plus other loads that are on the transformer bank.

You should know if the service provided is a true three-phase transformer system or one of the two transformer systems. This can be determined by counting the transformers, if the service is in, or by questioning the power company, if the service is not yet in. A full three phase supply is recommended for all three phase motors, consisting of three individual transformers. Here is an open-delta or wye system (on the left), with a true three-phase three transformer on the right.



Make sure that the transformer rating, in KVA, is adequate for the motor load by referring to this chart which references the KVA requirements by horsepower. Note that the minimum KVA rating, at the right on the chart, refers to **each** transformer used. This chart incidentally, covers only the motor KVA requirements and does not make allowance for other loads.

Motor Rating		Total Effective KVA Required	Smallest KVA Rating	Each Transformer
HP	KW		Open WYE or DELTA 2-Transformers	Closed WYE or DELTA 3-Transformers
1.5	1.1	3	2	1
2	1.5	4	2	1.5
3	2.2	5	3	2
5	3.7	7.5	5	3
7.5	5.5	10	7.5	5
10	7.5	15	10	5
15	11	20	15	7.5
20	15	25	15	10
25	18.5	30	20	10

NOTE: Standard KVA ratings are shown. If power company experience and practice allows transformer loading higher than standard, higher loading values may be used for transformer(s) to meet total effective KVA required provided correct voltage and balance is maintained.

STEP 2: SYSTEM REQUIREMENTS

Branch circuit protection, motor starters and overload heaters must be sized according to manufacturer's recommendations and the National Electrical Code in order to maintain warranty.

Manufacturer's recommended cable size must be followed from the transformer to the control panel **and** from the panel to the motor, based on the HP and voltage rating. Make sure that the length of cable in each case is no longer than the manufacturer's recommendation for that size of cable.

Whatever you do, remember, safety first! Before working inside the control panel or magnetic starter, always disconnect the line to the panel or starter. Be sure it is off. Double check this with a voltmeter.

Counter Clockwise is the correct direction of the propeller rotation when viewed from the propeller end of the mixer. To reverse direction of a THREE PHASE motor, the proper connections must be made in the motor connection chamber; refer to the W.Ds supplied in the motor connection chamber and control box.

Now that the correct rotation is established the amount of current unbalance between legs should be calculated as follows:

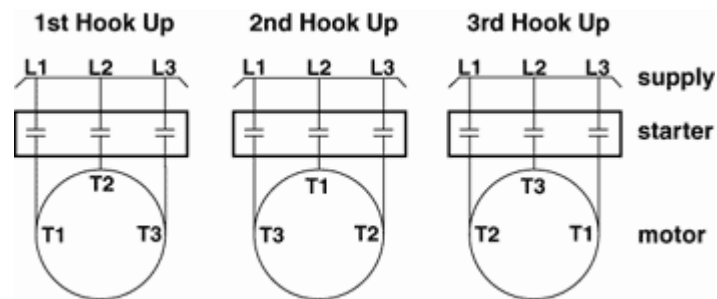
1. After correct rotation has been established, lower mixer into the water, check the current in each of three motor leads and calculate the current unbalance as explained in 2 below.

If the current unbalance is 2% or less, leave the leads as connected.

If the current unbalance is more than 2%, current readings should be checked on each leg using each of three possible hook-ups. Roll the motor leads across the starter in the same direction to prevent motor reversal.

2. To calculate percent of current unbalance:
 - A. Add the three line amps values together.
 - B. Divide the sum by three, yielding average current.
 - C. Pick the amp value which is furthest from the average current (either high or low).
 - D. Determine the difference between this amp value (furthest from average) and the average.
 - E. Divide the difference by the average. Multiply the result by 100 to determine percent of unbalance.

3. Current unbalance should not exceed 5% at service factor load or 10% at rated input load. If the unbalance cannot be corrected by rolling leads, the source of the unbalance must be located and corrected. If, on the three possible hookups, the leg farthest from the average stays on the same power lead, most of the unbalance is coming from the power source. However, if the reading farthest from the average moves with the same motor lead, the primary source of unbalance is on the “motor side” of the starter. In this instance, consider a damaged cable, leaking splice, poor connection, or faulty motor winding.



EXAMPLE:

T1 = 51 amps	T3 = 50 amps	T2 = 50 amps
T2 = 46 amps	T1 = 49 amps	T3 = 48 amps
+ T3 = 53 amps	+ T2 = 51 amps	+ T1 = 52 amps
<div style="background-color: black; width: 100px; height: 15px;"></div>	<div style="background-color: black; width: 100px; height: 15px;"></div>	<div style="background-color: black; width: 100px; height: 15px;"></div>
Total = 150 amps	Total = 150 amps	Total = 150 amps
$\frac{150}{3} = 50 \text{ amps}$	$\frac{150}{3} = 50 \text{ amps}$	$\frac{150}{3} = 50 \text{ amps}$
50 - 46 = 4 amps	50 - 49 = 1 amp	50 - 48 = 2 amps
$\frac{4}{50} = 0.08 \text{ or } 8\%$	$\frac{1}{50} = 0.02 \text{ or } 2\%$	$\frac{2}{50} = 0.04 \text{ or } 4\%$

Phase designation of leads for CCW rotation viewing shaft end.

To reverse rotation, interchange any two leads.

- Phase 1 or “A” – Black, T1, or U1
- Phase 2 or “B” – Yellow, T2 or V1
- Phase 3 or “C” – Red, T3 or W1

NOTICE: Phase 1, 2 and 3 may not be L1, L2 and L3.

4. Final Mixer Check, Before Starting

- A. Make sure propeller does not come in contact with any obstructions, ie., cable, walls, etc. and is rotating in correct direction.
- B. Position mixer at desired/required depth and direction.
- C. Tighten four (4) Azimuth clamp bolts.
- D. Drill a ½ inch hole into the clutch plate, lined up with posi-stop insert pin.
- E. Mixer is now ready for operation.

5. Water Level

For efficient mixer operation, the water level should be a minimum of two (2) feet above the propeller tip. Water levels below this point will result in lost mixer performance; cavitation, high levels of vibration (poor hydraulic balance on the propeller), which are detrimental to long mixer life, and a high degree of splashing.

6. Starting Mixer

- A. Check power cord to insure it cannot get into propeller.
- B. Check to insure equipment is secured.
- C. Check electrical connections.
- D. Insure mixer is submerged with minimum of two (2) feet of water above propeller tip.
- E. Start mixer. Immediately check running amps.

SYSTEM TROUBLE SHOOTING PROCEDURES

Motor Does Not Start

A.	No power or incorrect voltage	With voltmeter, check voltage at the line terminals. The voltage must be +/- 10% of rated motor voltage.	Contact power company to restore power or correct voltage.
B.	Fuses blown or circuit breaker tripped	Check fuses or circuit breakers for recommended size and check for loose, -dirty or corroded connections in fuse receptacle..Check for tripped circuit breakers.	Replace fuses with recommended size. Clean all connections. Reset circuit breakers.
C.	Wiring connections	Check for loose or corroded connections.	Clean or replace wiring connections.
D.	Thermal overload connections	Check continuity between P1 & P2 leads. Normally closed circuit. See drawing on page 10.	If no continuity between P1 & P2 leads, repair or replace motor
E.	Defective motor power cable	Check for cuts or damaged, power cable	Replace motor cable entry
F.	Defective motor	With ohm meter, check motor winding resistance	Repair or replace motor

SYSTEM TROUBLE SHOOTING PROCEDURES (CONT'D)

Motor Starter Trips

A.	Incorrect voltage	With voltmeter, check voltage at line connections. The voltage must be within +/- 10% of rated motor voltage .	Contact power company to correct voltage.
B.	Incorrect size or defective overload amperage rating relay/starter.	Check for proper amperage size overload relay/starter	Replace Relay/Starter
C.	Propeller fouled	Check propeller for debris	Remove debris from propeller

Motor Runs, but Does not have Water Movement

A.	Missing Propeller	Raise mixer and check for propeller	Replace propeller
B.	Output Shaft Key missing	Raise mixer. Remove propeller and check output shaft key	Replace key

Motor Runs Has Excessive Vibration

A.	Propeller Fouled	Raise mixer and check for debris	Remove debris
B.	Imbalanced or loose propeller	Raise mixer and check propeller	Repair or Replace
C.	Loose or missing mounting hardware	Raise mixer and inspect for loose or missing hardware	Repair or Replace

INTER-MIX DIRECT DRIVE MIXER PERIODIC MAINTENANCE PROCEDURES

2,200 HOURS

!WARNING: DISCONNECT POWER AND LOCK OUT

1. Raise the mixer out of the water.
2. The unit should be level for inspection.
3. Visually inspect entire unit for loose hardware. Re-torque all hardware as necessary
4. Inspect the unit for any damage or deterioration.
5. Inspect the oil level in the fairwater. Remove oil level plug to determine adequate oil level. (Refer to Dwg #D01002A Pg. 23 for location of plugs.) Inspect area behind propeller. Remove any rags and debris around seal retainer. Inspect for oil leaking from front seal retainer. (Check oil for water intrusion)
6. If oil level is low, if there is water mixed with the oil, or if there is oil leaking around the seal, contact factory.
7. Change oil in fairwater. Replace with 30 weight, non-detergent oil to fill plug.

4,400 HOURS

1. Repeat the 2,200 Hour procedure, except for Step 7.
2. Remove the cable entry. If motor is filled with water (a small amount is normal due to condensation); or any oil is found, contact factory.

6,600 HOURS

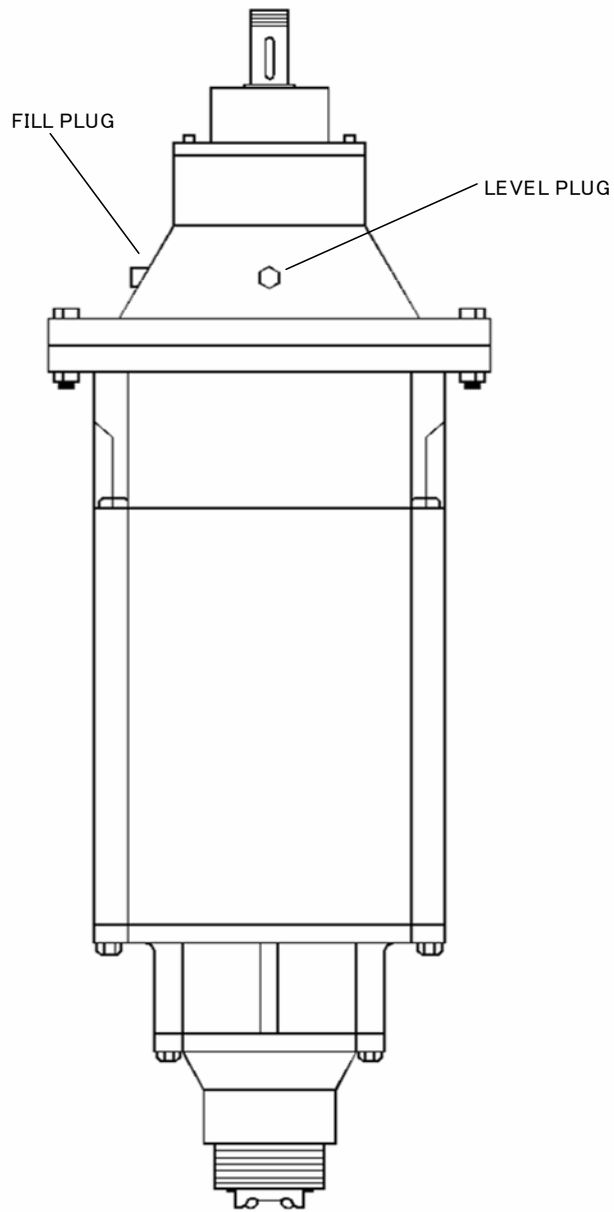
1. Repeat 4,400 Hour procedure.


8,800 HOURS

1. Unit must be removed from mast.
2. Remove propeller from mixer.

(Cont'd)

3. Remove rags and debris from mechanical seal guard. Inspect for oil leaking from seal retainer.
4. Inspect oil for water, if any water is found replace mechanical seal. (Refer to mechanical seal section).
5. Remove oil fill and level plug. Rotate mixer and drain oil through fill plug.
6. While fairwater oil is draining, remove cable entry and inspect for excessive water or any oil. If found, contact factory.
7. Fill fairwater with kerosene or mineral spirits to oil fill level. Run mixer for about 60 seconds and drain. Repeat, if needed, to flush out fairwater. Replace with 30 weight non-detergent oil to fill plug.
8. After first 8,800 hours, it is recommended to follow the 4,400 hour procedure every 3,000 hours thereafter.
9. Changing oil in the fairwater every 8,000 hours after first 8,800 hours is recommended.

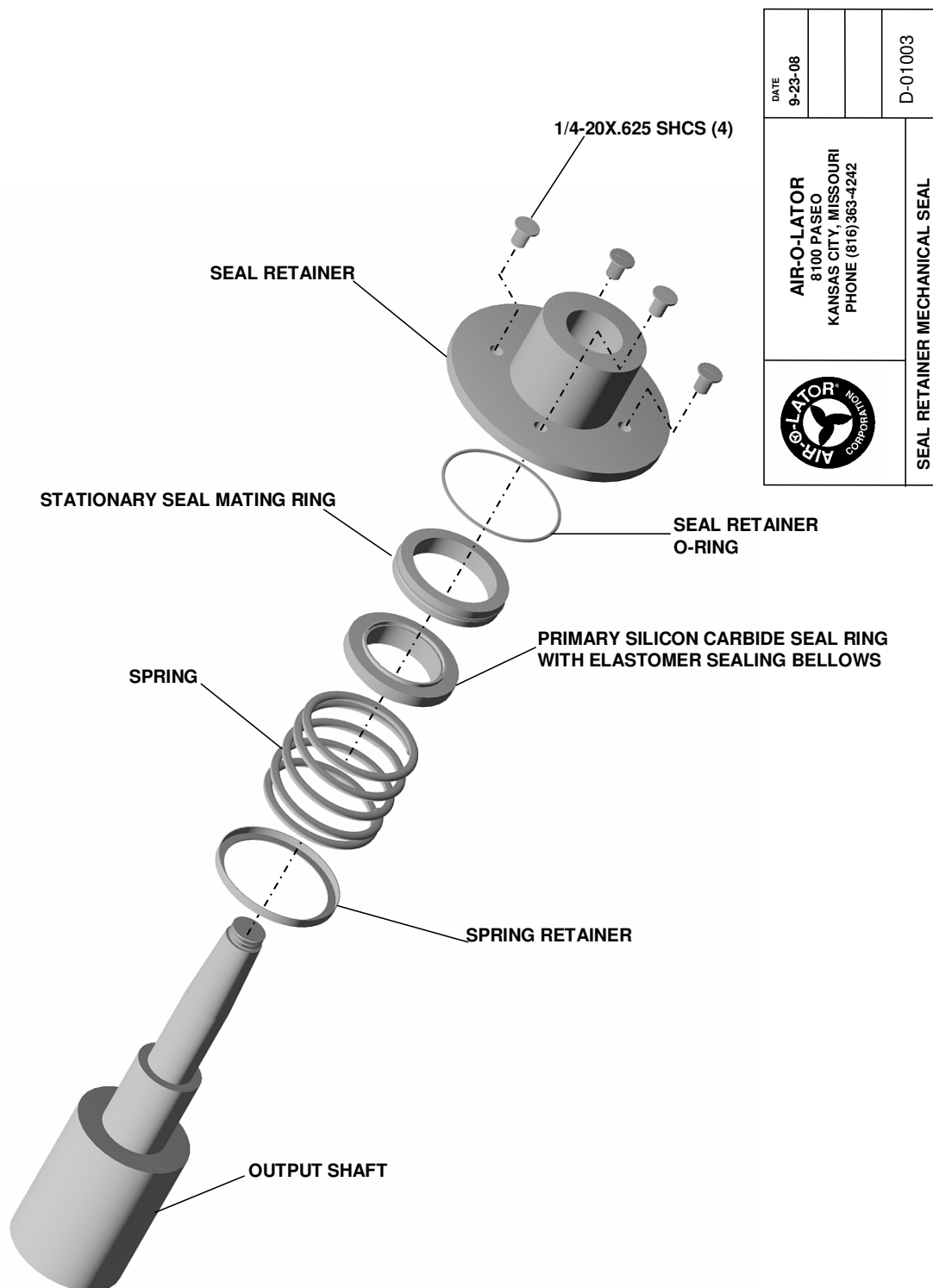


Date: 12/30/08		
AIR-O-LATOR 8100 PASEO KANSAS CITY, MISSOURI PHONE (816)363-4242		
IMRDDENTII Oil Plug Location		
		

FAIRWATER MECHANICAL SEAL REPLACEMENT PROCEDURES
(Refer to Seal Retainer Drawing #D01003, Pg. 25)

!WARNING: TURN OFF POWER AND LOCKOUT

1. Disconnect power cable from power source and lockout.
2. Remove mixer assembly from mast.
3. Remove propeller from mixer shaft by removing nut and sliding propeller off shaft.
4. Drain oil from fairwater.
5. Remove seal retainer by removing four (4) socket head cap screws.
6. Slide seal retainer off shaft.
7. Remove original mechanical seal and spring and discard.
8. Remove stationary seal from seal retainer and discard.
9. Clean seal retainer and inspect for any cracks or deterioration.
10. Clean fairwater output shaft. Inspect shaft for scoring.
11. Inspect bearing (contact factory if bad).
12. Install stationary seal into seal retainer, lapped face toward the output shaft, keep clean.
13. Install "O" ring on seal retainer.
14. Install spring retainer with flat side against shaft shoulder, cup towards spring.
15. Install spring.
16. Lubricate elastomer bellows located within the silicon carbide seal ring with soapy water.
17. Install primary silicon carbide mating seal placing the lapped seal end away from the 18. motor toward the shaft end and the stationary seal mating ring.
18. Install seal retainer.
19. Reinstall the four (4) 1/4-20 x 5/8" SS socket head cap screws.
20. Insure that seal retainer is properly aligned.
21. Refill fairwater with 30 weight non-detergent oil to fill plug.
22. Insure that no oil is leaking from around seal retainer.
23. Install the propeller.
24. Insure the propeller rotates smooth and tracks evenly.
25. Mixer is now ready to be reinstalled.



INTER-MIX DIRECT DRIVE MOTOR ASSEMBLY (Refer to Dwg. D01004, Pg. 27 and D01005, Pg. 28)

Seal Replacement & Installation Procedures

NOTE: Removal of the propeller, fairwater and cable entry from the motor is required to remove or inspect motor seals.

!WARNING: TURN OFF POWER AND LOCK OUT

1. Place motor with shaft end up on a stationary flat surface. Be certain that the motor will not topple.

!CAUTION: Spring is under load.

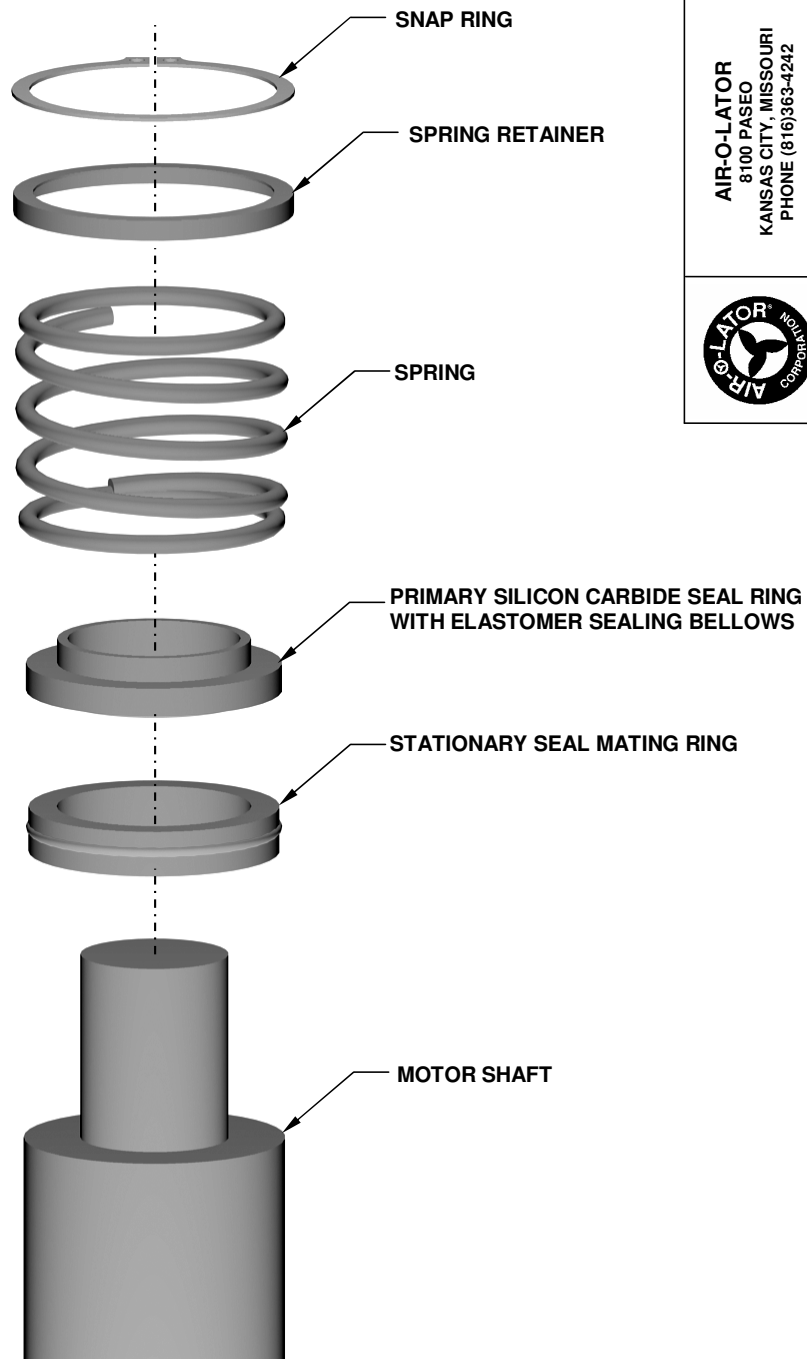
2. Remove the snap ring, spring retainer and spring from shaft.
3. Remove the primary silicon carbide seal ring from the motor shaft and discard.
4. Remove the four (4) bolts from the motor flange and remove the motor flange by lifting the flange up and over the motor shaft and remove the stationary seal mating ring.


!CAUTION: The oil chamber will be full of oil.

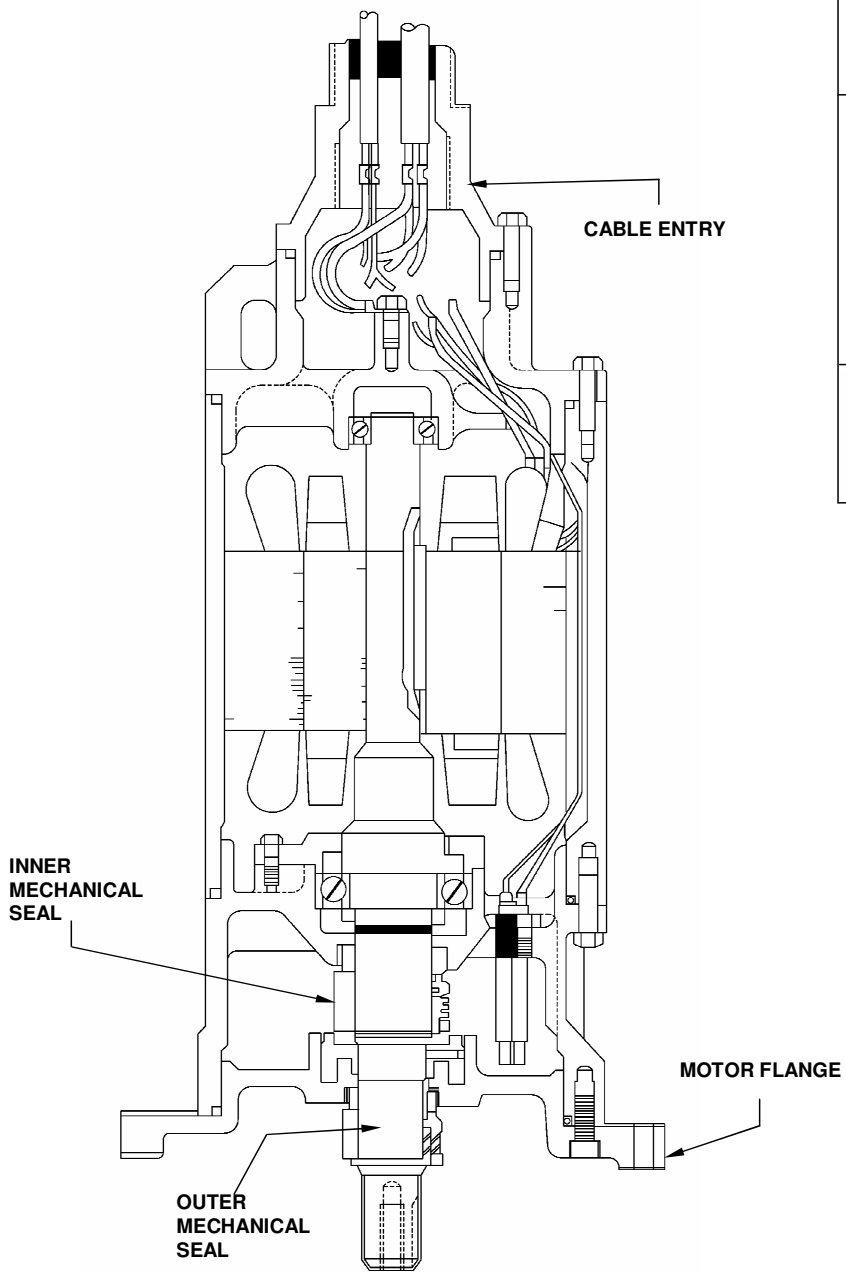
5. Change the oil in the oil chamber.


Installation of Mechanical Seal

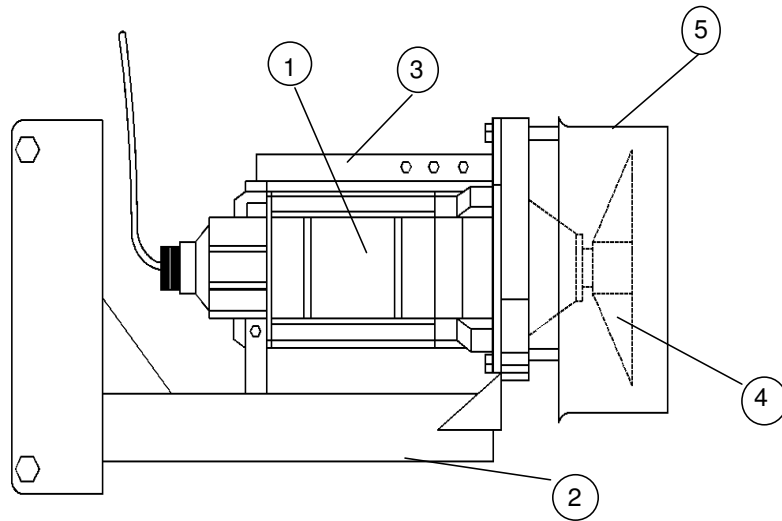
1. Clean all parts to be reassembled.
2. Insert the stationary seal mating ring of the mechanical seal into the motor flange.
3. Inspect the motor flange, O-ring and replace if any nicks or irregularities are evident.
4. Reinstall the flange onto the motor. Use caution to prevent damage to the O-ring or mechanical seal.
5. Tighten four (4) flange bolts as required. See torque tightening chart on page 8 by selecting correct bolt size.
6. Continue with mechanical seal installation instructions.
7. Reinstall the cable entry, fairwater, and propeller to the motor.



DATE	10-30-08			D01004
AIR-O-LATOR 8100 PASEO KANSAS CITY, MISSOURI PHONE (816)363-4242				RELANCE MOTOR SEAL REPLACEMENT
				

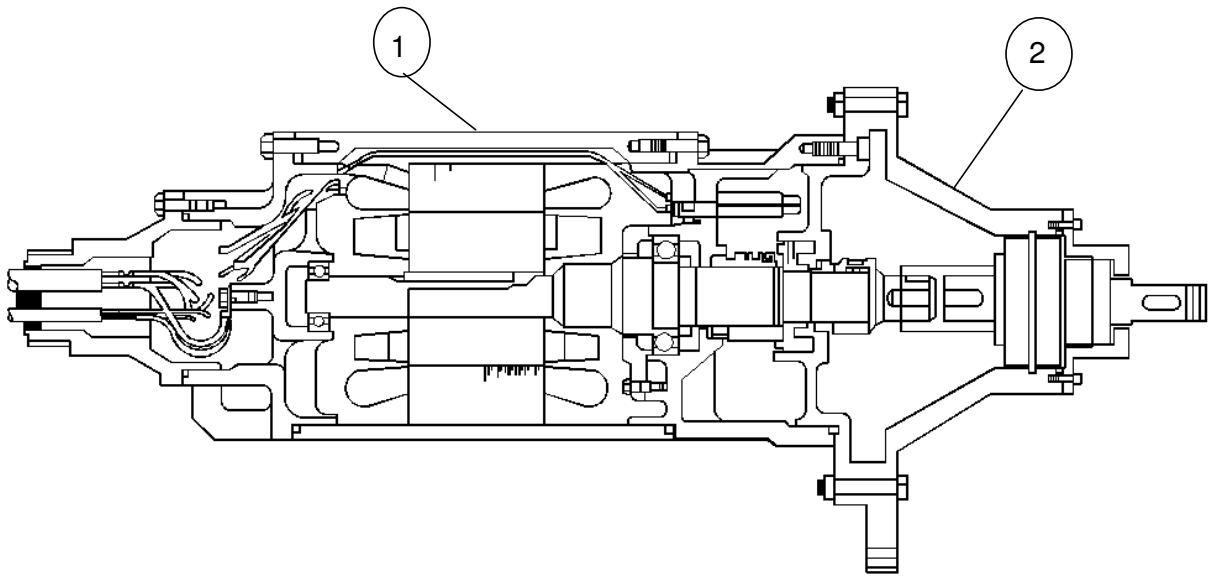


	AIR-O-LATOR 8100 PASEO KANSAS CITY, MISSOURI PHONE (816)363-4242	DATE	9-23-08
Motor Section View		D01005	



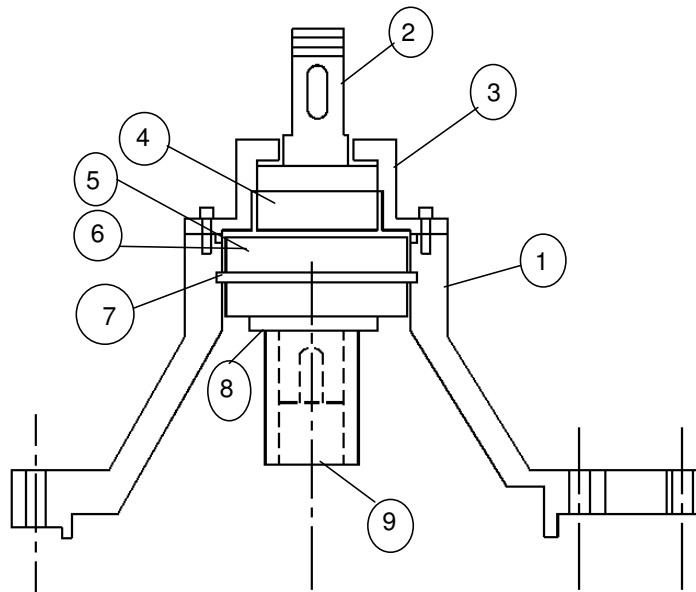
INTER-MIX DIRECT DRIVE MIXER
5HP, 230V, 3PH
PART NO. 94IMRDD52303

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	90IMRDD52303	MOTOR ASSEMBLY, 5HP, 230V, 3PH	1
2	90MMDDDETII	MOTOR MOUNT, IMR-DD, ENT II	1
3	90LBIMR180	LIFTING BAR, 180	1
4	71PS10X8	PROPELLER, SS, 5HP, 10 X 8	1
5	61PSIMRDD	SHROUD, PROP, IMR-DD	1



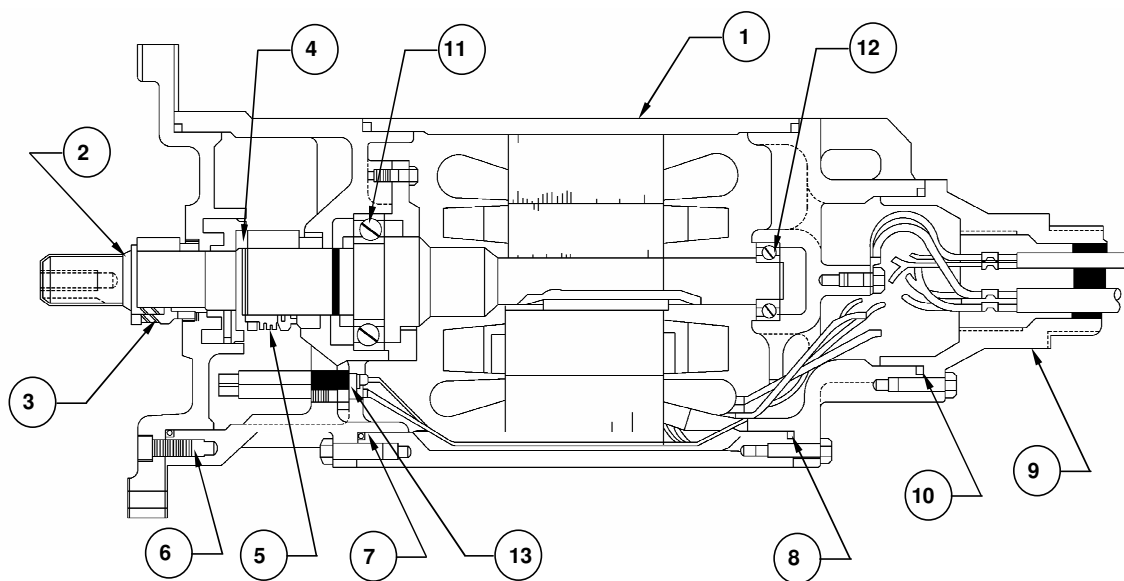
INTER-MIX DIRECT DRIVE MOTOR ASSEMBLY
5HP, 230V, 3PH
PART NO. 90IMRDDMA52303

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	49P18G2701	MOTOR, 5HP, 230V, 3PH	1
2	90N180F	FAIRWATER, 180, FRAME,	1



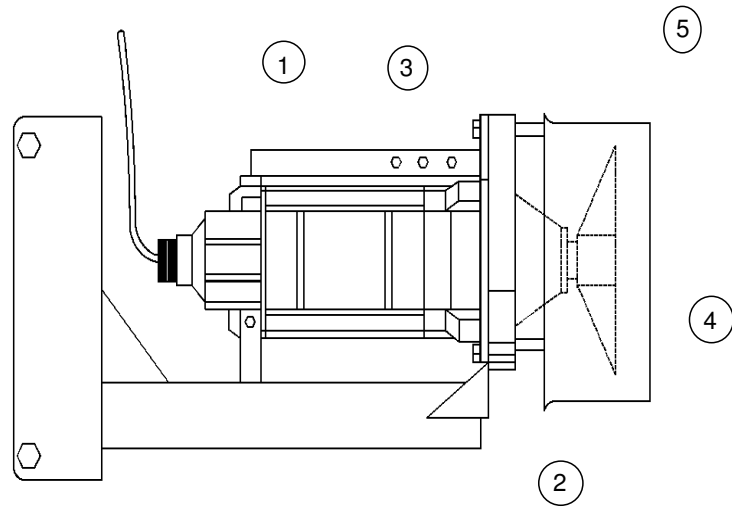
FAIRWATER, 180 FRAME
90N180F

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	58N180FA	FAIRWATER, FLANGE, 180	1
2	58SODDENT	SHAFT, OUTPUT, IMR-DD, ENT II	1
3	58GBSR-D	SEAL, RETAINER	1
4	37SM-175SC	SEAL, MECH, 1-3/4" SIL.	1
5	58R18520	RACE, BEARING, #18520	2
6	58B18590	BEARING, ROLLER TAPER, #18590	2
7	29SR-2875	RING, SPIRAL RETAINING, INTERNAL	1
8	18LN-BH-08	NUT, LOCK, 1.5630X18	1
9	58CSO	COUPLING, SHAFT, OUTPUT, ENTII	1



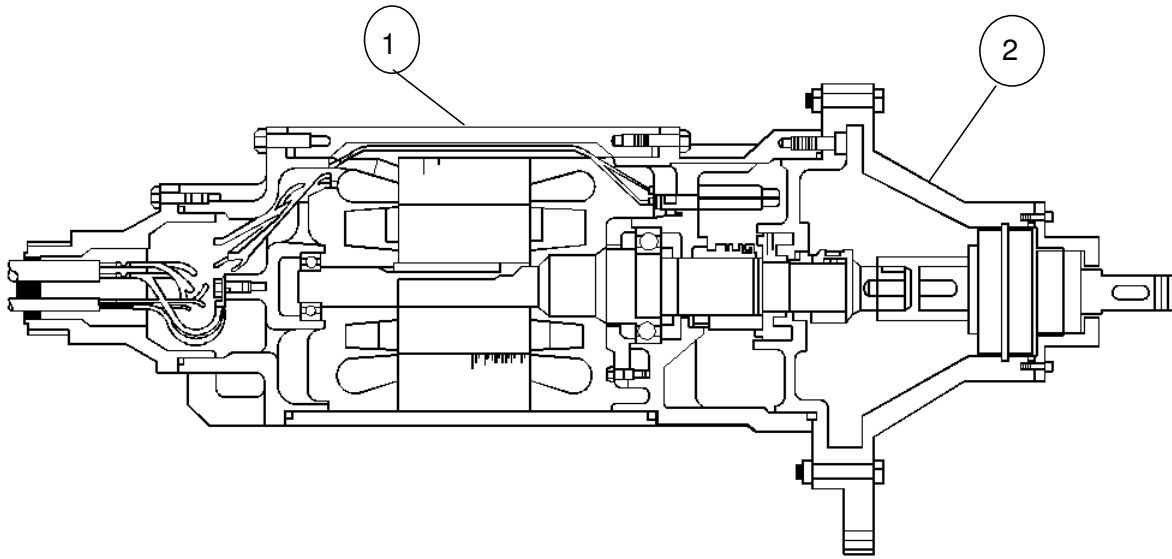
RELIANCE MOTOR ASSEMBLY

ITEM	PART	PART	
NO.	NO.	DESCRIPTION	QTY.
1	49P18G2701	MOTOR, 5.0 HP, 230V, 3PH	1
2	29SR-150SS	SNAP RING, 1.5	1
3	37SM-150CC	MECHANICAL SEAL, 1.5	1
4	29SR-175SS	SNAP RING, 1.75	1
5	37SM-175CC	MECHANICAL SEAL, 1.75	1
6, 7, 8	29OR264	"O" RING #264	1
9	58CE180R25	CABLE ENTRY 180F25	1
10	29OR246	"O" RING #246	1
11	58LB-210KDD	BEARING, 210, KDD	1
12	58UB-205KDD	BEARING, 205, KDD	1
13	15E3H1B1	MOISTURE PROBE	2



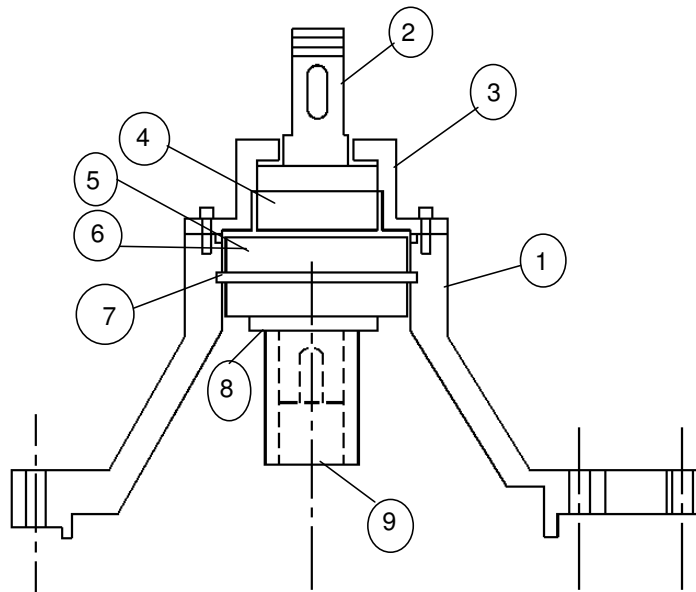
INTER-MIX DIRECT DRIVE MIXER
5HP, 460V, 3PH
PART NO. 94IMRDD54603

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	90IMRDD54603	MOTOR ASSEMBLY, 5HP, 460V, 3PH	1
2	90MMDDDETII	MOTOR MOUNT, IMR-DD, ENT II	1
3	90LBIMR180	LIFTING BAR, 180	1
4	71PS10X8	PROPELLER, SS, 5HP, 10 X 8	1
5	61PSIMRDD	SHROUD, PROP, IMR-DD	1



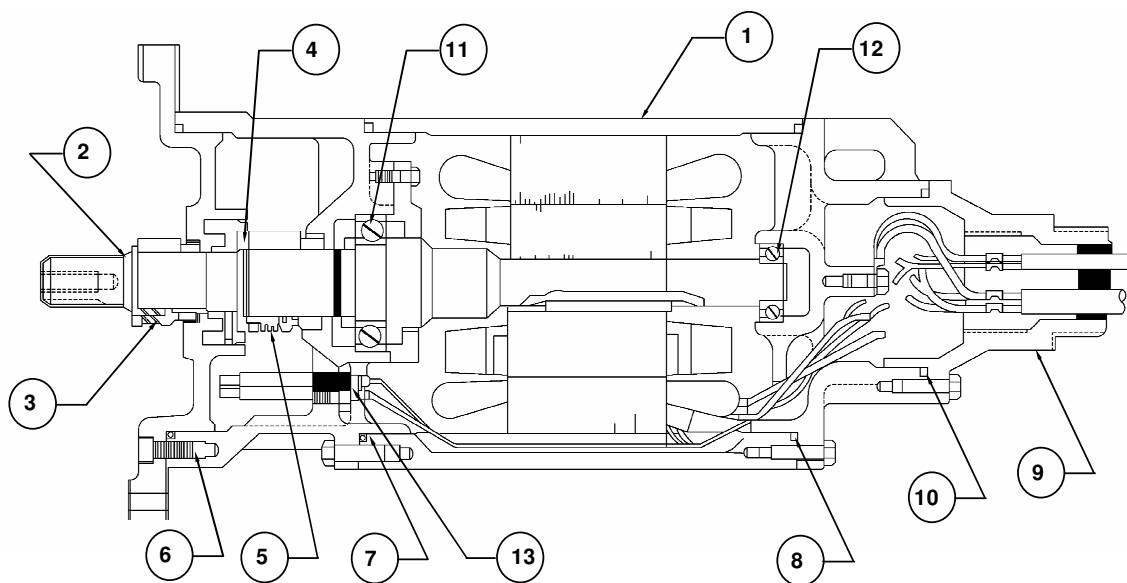
INTER-MIX DIRECT DRIVE MIXER MOTOR ASSEMBLY
5HP, 460V, 3PH
PART NO. 90IMRDDMA54603

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	49P18G2702	MOTOR, 5HP, 460V, 3PH	1
2	90N180F	FAIRWATER, 180, FRAME	1



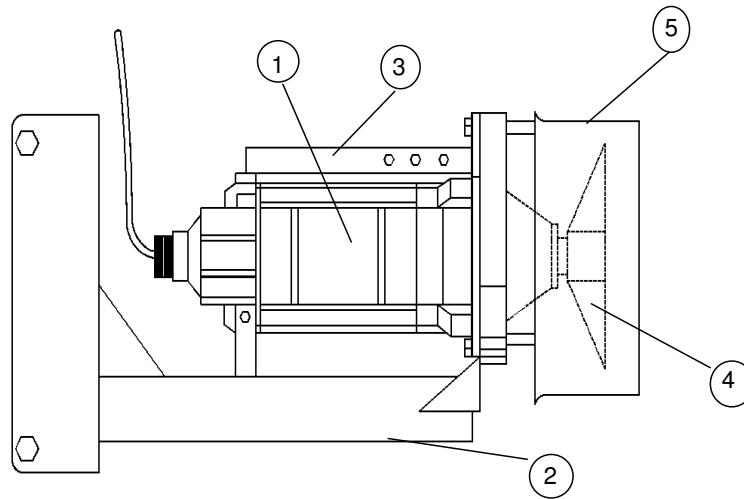
FAIRWATER, 180 FRAME
90N180F

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	58N180FA	FAIRWATER, FLANGE, 180	1
2	58SODDENT	SHAFT, OUTPUT, IMR-DD, ENT II	1
3	58GBSR-D	SEAL, RETAINER	1
4	37SM-175SC	SEAL, MECH, 1-3/4" SIL.	1
5	58R18520	RACE, BEARING, #18520	2
6	58B18590	BEARING, ROLLER TAPER, #18590	2
7	29SR-2875	RING, SPIRAL RETAINING, INTERNAL	1
8	18LN-BH-08	NUT, LOCK, 1.5630X18	1
9	58CSO	COUPLING, SHAFT, OUTPUT, ENTII	1



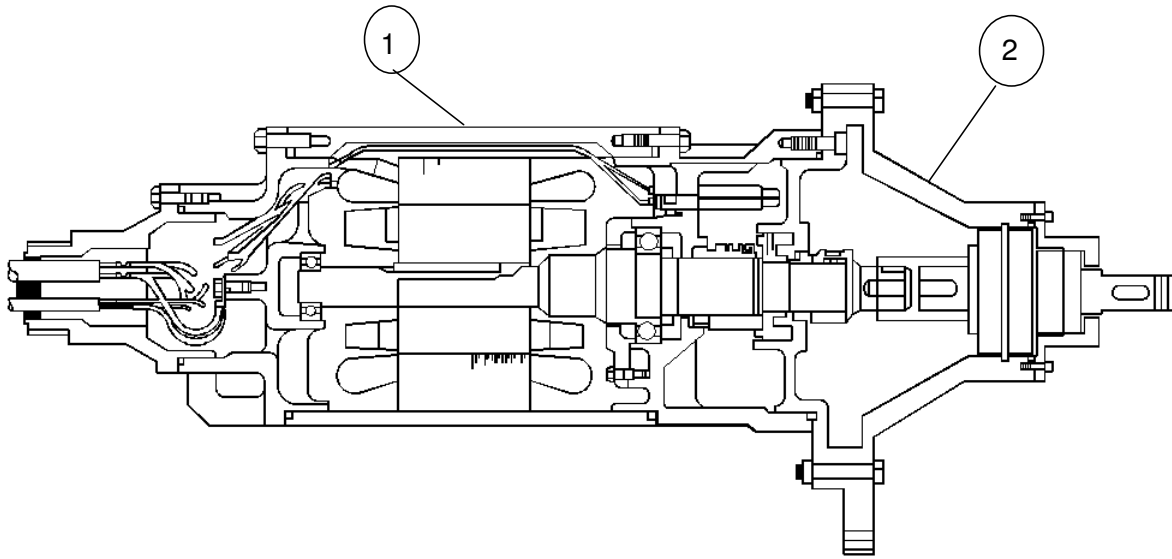
RELIANCE MOTOR ASSEMBLY

ITEM	PART	PART	
NO.	NO.	DESCRIPTION	QTY.
1	49P18G2702	MOTOR, 5.0 HP, 460V, 3PH	1
2	29SR-150SS	SNAP RING, 1.5	1
3	37SM-150CC	MECHANICAL SEAL, 1.5	1
4	29SR-175SS	SNAP RING, 1.75	1
5	37SM-175CC	MECHANICAL SEAL, 1.75	1
6, 7, 8	29OR264	"O" RING #264	1
9	58CE180R25	CABLE ENTRY 180F25	1
10	29OR246	"O" RING #246	1
11	58LB-210KDD	BEARING, 210, KDD	1
12	58UB-205KDD	BEARING, 205, KDD	1
13	15E3H1B1	MOISTURE PROBE	2



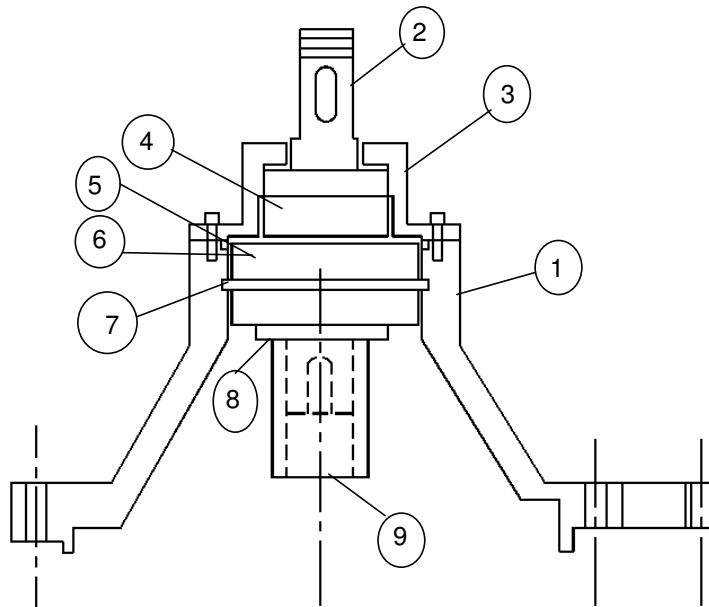
INTER-MIX DIRECT DRIVE MIXER
7.5HP, 230V, 3PH
PART NO. 94IMRDD752303

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	90IMRDD752303	MOTOR ASSEMBLY, 7.5HP, 230V, 3PH	1
2	90MMDDDETII	MOTOR MOUNT, IMR-DD, ENT II	1
3	90LBIMR180	LIFTING BAR, 180	1
4	71PS12X6	PROPELLER, SS, 7.5HP, 12 X 6	1
5	61PSIMRDD	SHROUD, PROP, IMR-DD	1



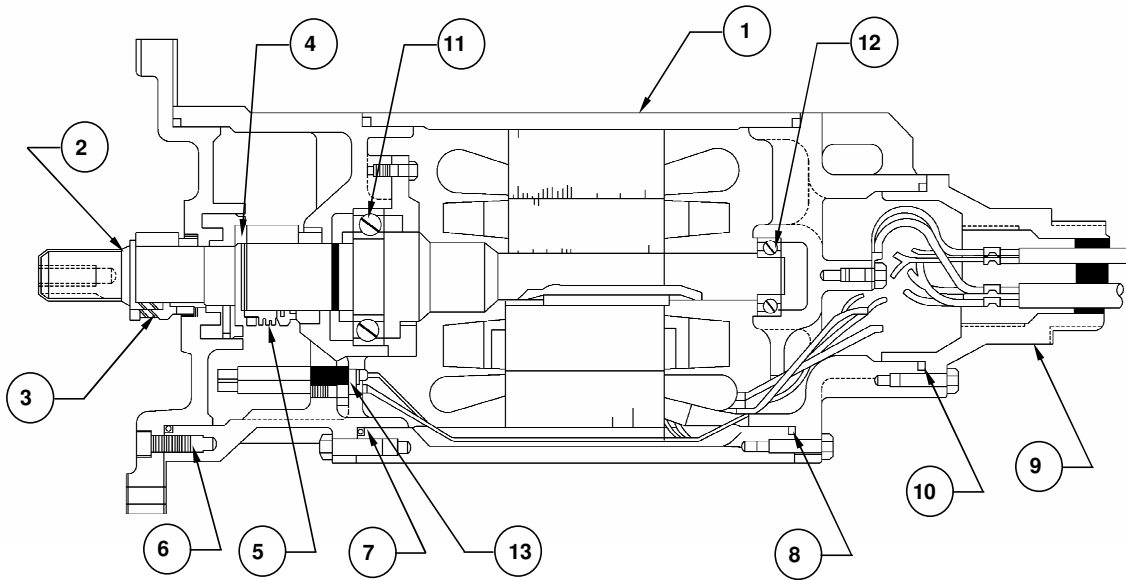
INTER-MIX DIRECT DRIVE MIXER MOTOR ASSEMBLY
7.5HP, 230V, 3PH
PART NO. 90IMRDDMA752303

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	49P18G2703	MOTOR, 7.5HP, 230V, 3PH	1
2	90N180F	FAIRWATER, 180, FRAME	1



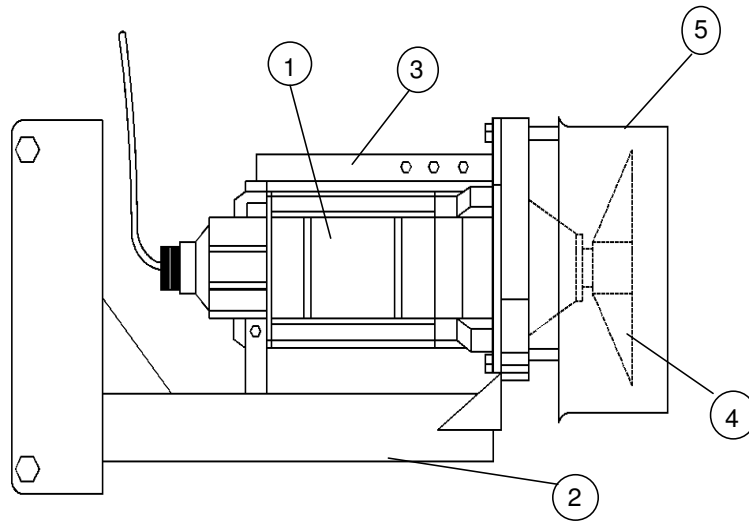
FAIRWATER, 180 FRAME
90N180F

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	58N180FA	FAIRWATER, FLANGE, 180	1
2	58SODDENT	SHAFT, OUTPUT, IMR-DD, ENT II	1
3	58GBSR-D	SEAL, RETAINER	1
4	37SM-175SC	SEAL, MECH, 1-3/4" SIL.	1
5	58R18520	RACE, BEARING, #18520	2
6	58B18590	BEARING, ROLLER TAPER, #18590	2
7	29SR-2875	RING, SPIRAL RETAINING, INTERNAL	1
8	18LN-BH-08	NUT, LOCK, 1.5630X18	1
9	58CSO	COUPLING, SHAFT, OUTPUT, ENTII	1



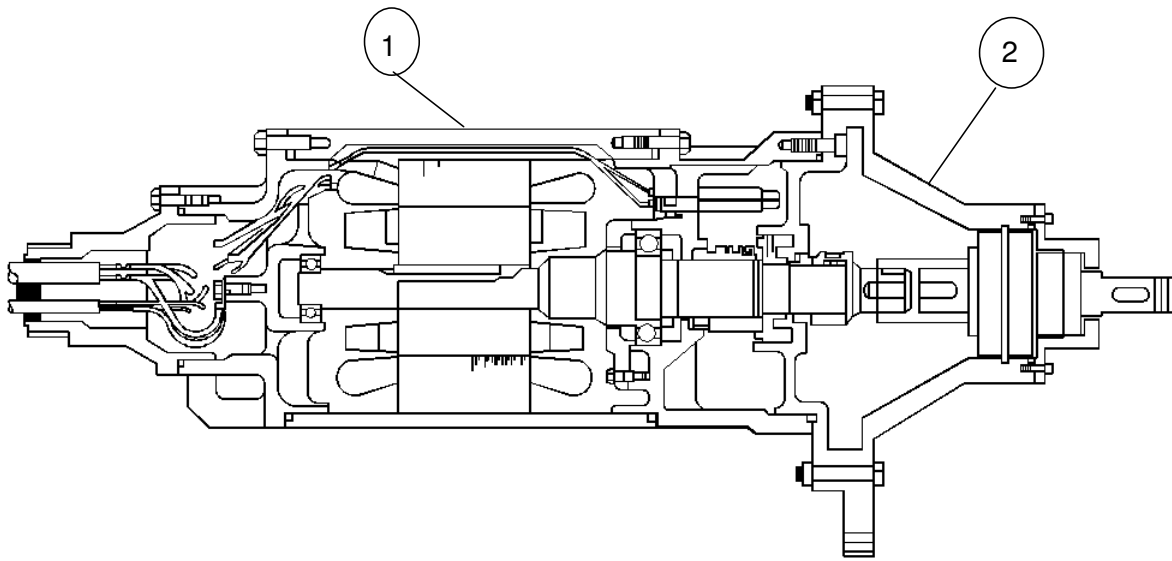
RELIANCE MOTOR ASSEMBLY

ITEM	PART	PART	
NO.	NO.	DESCRIPTION	QTY.
1	49P18G2703	MOTOR, 7.50 HP, 230V, 3PH	1
2	29SR-150SS	SNAP RING, 1.5	1
3	37SM-150CC	MECHANICAL SEAL, 1.5	1
4	29SR-175SS	SNAP RING, 1.75	1
5	37SM-175CC	MECHANICAL SEAL, 1.75	1
6, 7, 8	29OR264	"O" RING #264	1
9	58CE180R25	CABLE ENTRY 180F25	1
10	29OR246	"O" RING #246	1
11	58LB-210KDD	BEARING, 210, KDD	1
12	58UB-205KDD	BEARING, 205, KDD	1
13	15E3H1B1	MOISTURE PROBE	2



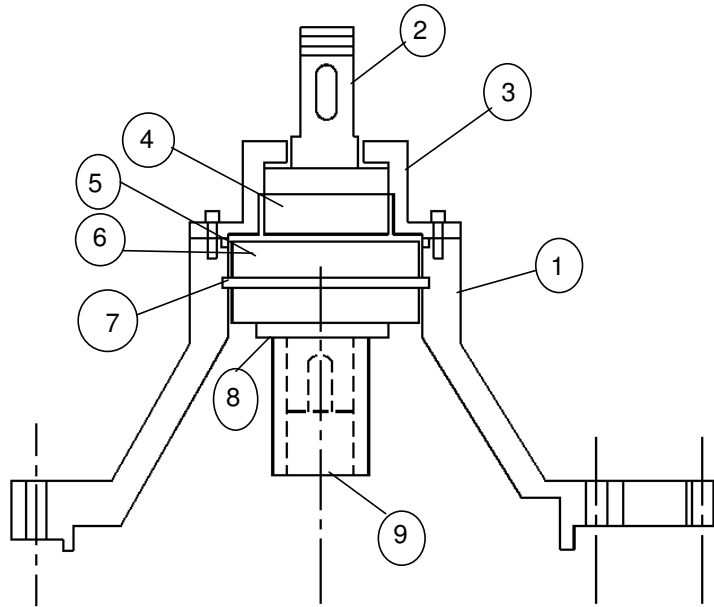
INTER-MIX DIRECT DRIVE MIXER
7.5HP, 460V, 3PH
PART NO. 94IMRDD754603

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	90IMRDD754603	MOTOR ASSEMBLY, 7.5HP, 460V, 3PH	1
2	90MMDDDETII	MOTOR MOUNT, IMR-DD, ENT II	1
3	90LBIMR180	LIFTING BAR, 180	1
4	71PS12X6	PROPELLER, SS, 7.5HP, 12 X 6	1
5	61PSIMRDD	SHROUD, PROP, IMR-DD	1



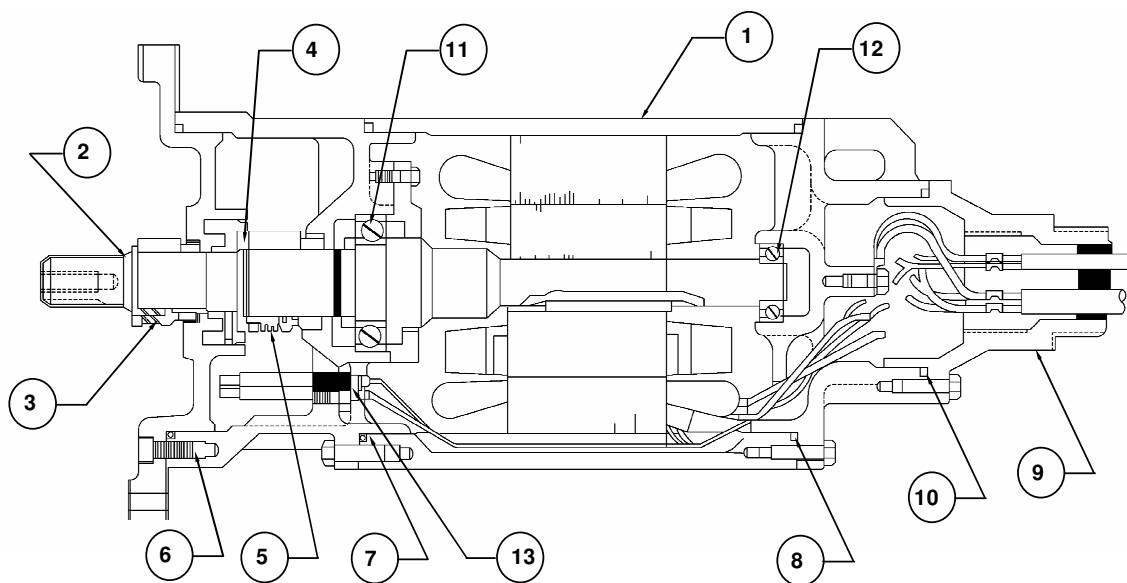
INTER-MIX DIRECT DRIVE MIXER MOTOR ASSEMBLY
7.5HP, 460V, 3PH
PART NO. 90IMRDDMA754603

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	49P18G2704	MOTOR, 7.5HP, 460V, 3PH	1
2	90N180F	FAIRWATER, 180, FRAME	1



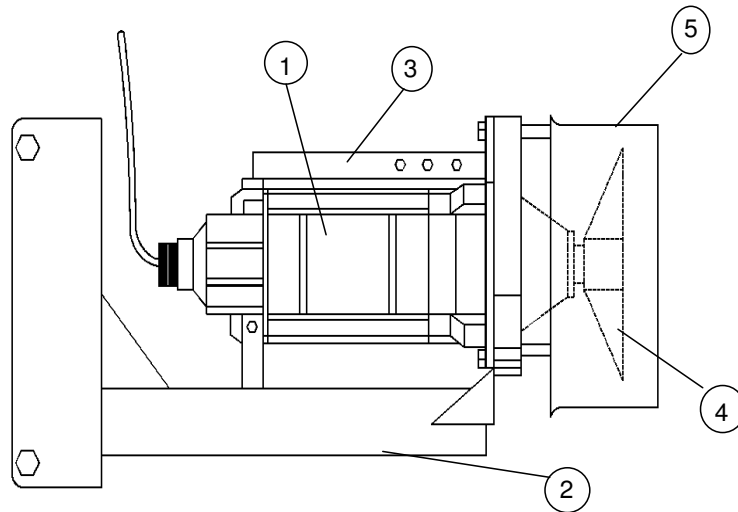
FAIRWATER, 180 FRAME
90N180F

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	58N180FA	FAIRWATER, FLANGE, 180	1
2	58SODDENT	SHAFT, OUTPUT, IMR-DD, ENT II	1
3	58GBSR-D	SEAL, RETAINER	1
4	37SM-175SC	SEAL, MECH, 1-3/4" SIL.	1
5	58R18520	RACE, BEARING, #18520	2
6	58B18590	BEARING, ROLLER TAPER, #18590	2
7	29SR-2875	RING, SPIRAL RETAINING, INTERNAL	1
8	18LN-BH-08	NUT, LOCK, 1.5630X18	1
9	58CSO	COUPLING, SHAFT, OUTPUT, ENTII	1



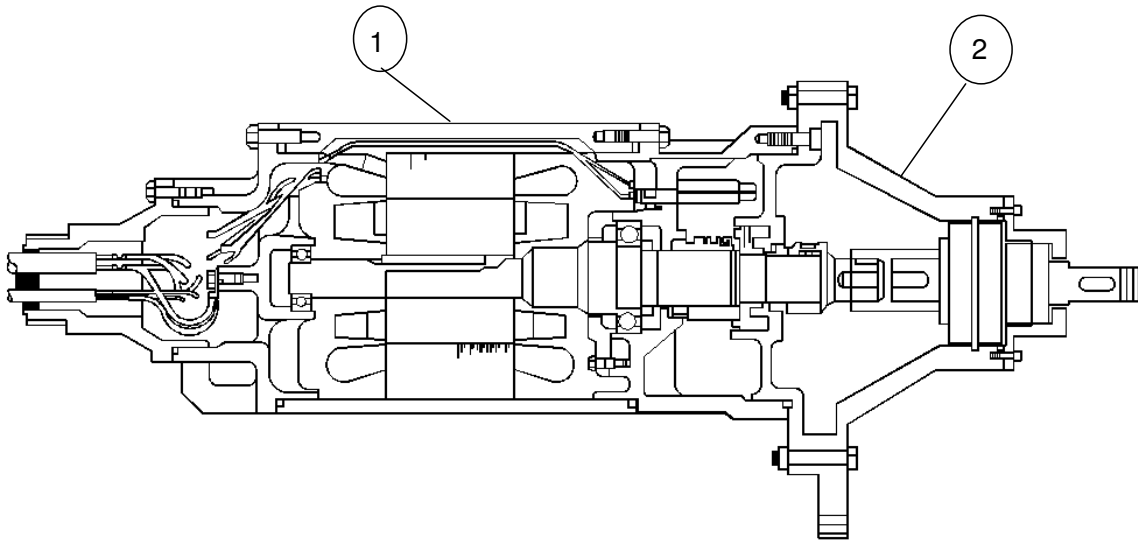
RELIANCE MOTOR ASSEMBLY

ITEM	PART	PART	
NO.	NO.	DESCRIPTION	QTY.
1	49P18G2704	MOTOR, 7.50 HP, 460V, 3PH	1
2	29SR-150SS	SNAP RING, 1.5	1
3	37SM-150CC	MECHANICAL SEAL, 1.5	1
4	29SR-175SS	SNAP RING, 1.75	1
5	37SM-175CC	MECHANICAL SEAL, 1.75	1
6, 7, 8	29OR264	"O" RING #264	1
9	58CE180R25	CABLE ENTRY 180F25	1
10	29OR246	"O" RING #246	1
11	58LB-210KDD	BEARING, 210, KDD	1
12	58UB-205KDD	BEARING, 205, KDD	1
13	15E3H1B1	MOISTURE PROBE	2



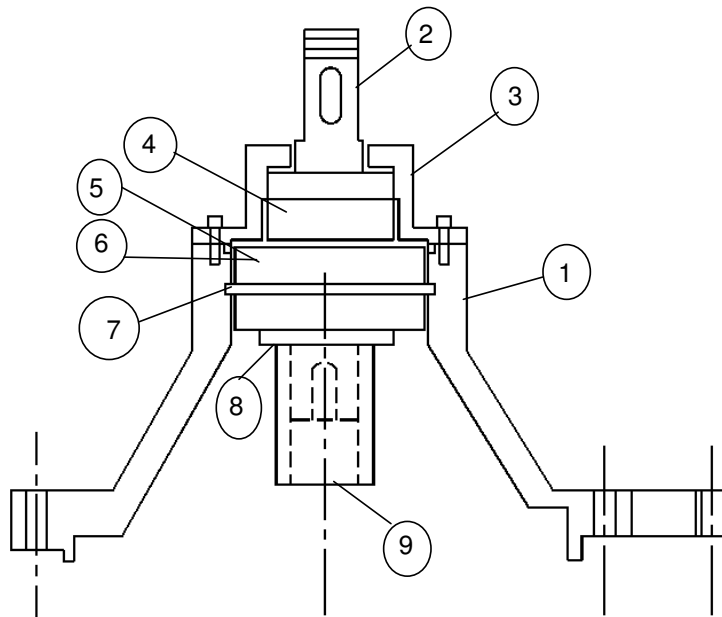
INTER-MIX DIRECT DRIVE MIXER
10HP, 460V, 3PH
PART NO. 94IMRDD104603

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	90IMRDD104603	MOTOR ASSEMBLY, 10HP, 460V, 3PH	1
2	90MMDDDETII	MOTOR MOUNT, IMR-DD, ENT II	1
3	90LBIMR180	LIFTING BAR, 180	1
4	71PS13X6	PROPELLER, SS, 10HP, 13 X 6	1
5	61PSIMRDD	SHROUD, PROP, IMR-DD	1



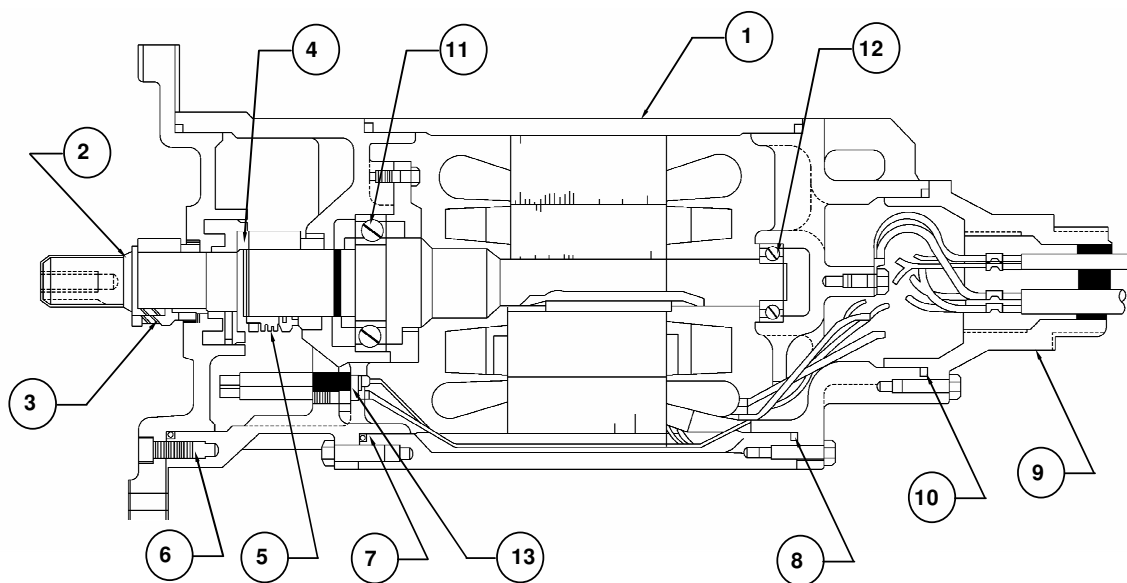
INTER-MIX DIRECT DRIVE MIXER MOTOR ASSEMBLY
10HP, 460V, 3PH
PART NO. 90IMRDDMA104603

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	49P21G2735	MOTOR, 10HP, 460V, 3PH	1
2	90N180F	FAIRWATER, 180, FRAME	1



**FAIRWATER, 180 FRAME
90N180F**

ITEM NO.	PART NO.	PART DESCRIPTION	QTY
1	58N180FA	FAIRWATER, FLANGE, 180	1
2	58SODDENT	SHAFT, OUTPUT, IMR-DD, ENT II	1
3	58GBSR-D	SEAL, RETAINER	1
4	37SM-175SC	SEAL, MECH, 1-3/4" SIL.	1
5	58R18520	RACE, BEARING, #18520	2
6	58B18590	BEARING, ROLLER TAPER, #18590	2
7	29SR-2875	RING, SPIRAL RETAINING, INTERNAL	1
8	18LN-BH-08	NUT, LOCK, 1.5630X18	1
9	58CSO	COUPLING, SHAFT, OUTPUT, ENTII	1



RELIANCE MOTOR ASSEMBLY

ITEM	PART	PART	
NO.	NO.	DESCRIPTION	QTY.
1	49P21G2735	MOTOR, 10.0 HP, 460V, 3PH	1
2	29SR-175SS	SNAP RING, 1.75	1
3	37SM-175CC	MECHANICAL SEAL, 1.75	1
4	29SR-200SS	SNAP RING, 2.0	1
5	37SM-200CC	MECHANICAL SEAL, 2.0	1
6, 7, 8	29OR268	"O" RING #268	1
9	58CE210R25	CABLE ENTRY 210F25	1
10	29OR254	"O" RING #254	1
11	58LB-212KDD	BEARING, 212, KDD	1
12	58UB-206KDD	BEARING, 206, KDD	1
13	15E3H1B1	MOISTURE PROBE	2