

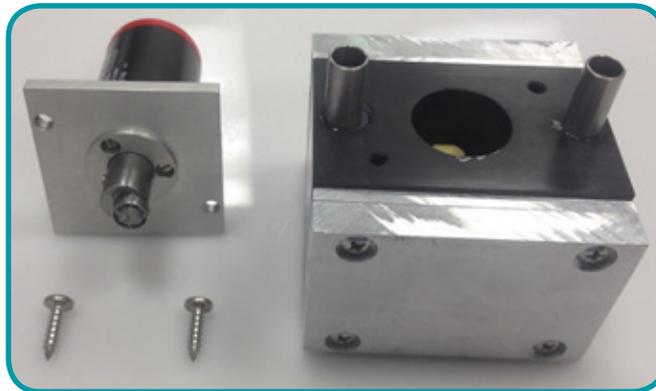
## Technical Note: PQ200 Pump Rebuild

Rebuilding your PQ200 sampling pump is easy to do and will save you both time and money. Pump motors and diaphragms should be replaced after 9000 hours of use, while eccentric bearing and valves can be replaced after 14,000 hours of use.



### Step 1: Motor/Bearing Assembly

To start rebuilding your pump, remove the two screws that secure the motor to the pump body. The motor assembly can now be pulled away from the pump body.

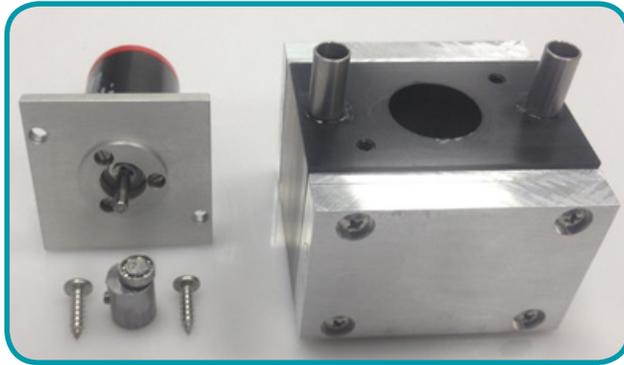


Inspect the eccentric bearing for looseness on the shaft. Inspect the bearing for smooth rotation and absence of play. If these components are in good condition, then wipe the bearing clean with a fresh, lint free cloth and re-lubricate with light grease. Set aside for reassembling.

### Step 2

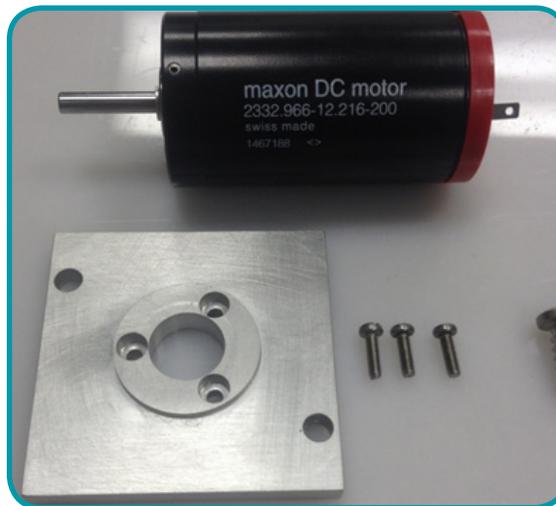
If the bearing requires replacement, loosen the set screw on the eccentric shaft and remove the bearing or eccentric assembly. Replace with a new assembly, pushing it firmly on the shaft as far as it will go, before tightening the set screw.

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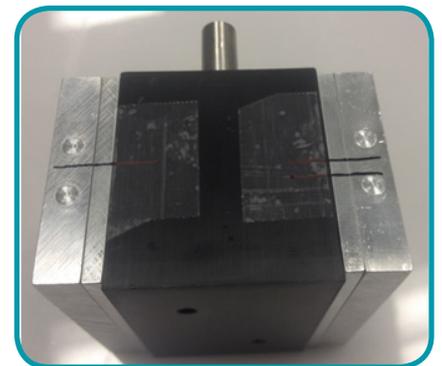
## Step 3

If the motor also requires replacement after removing the eccentric bearing assembly, also remove the three motor plate screws which secure the motor plate to the motor. The new motor is attached to the plate utilizing the three screws just removed.



## Step 4

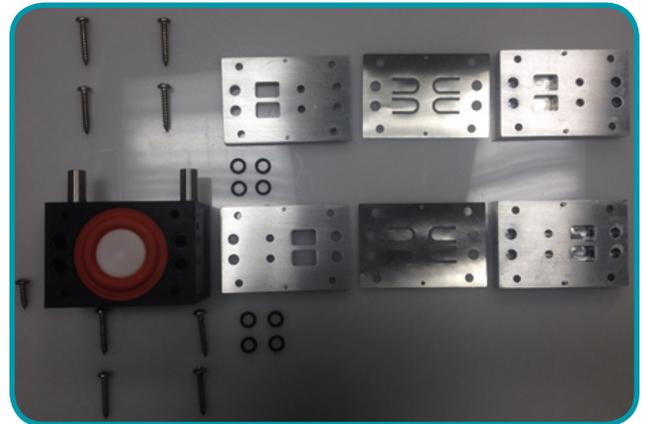
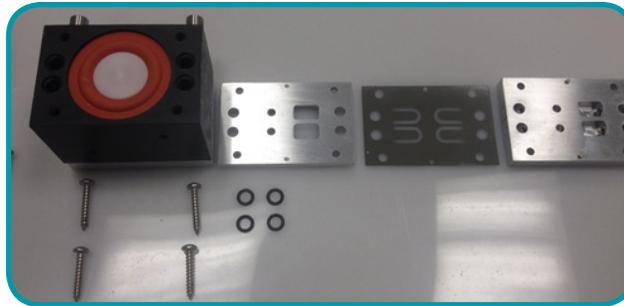
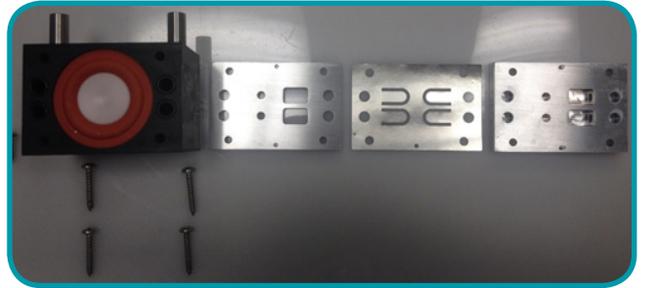
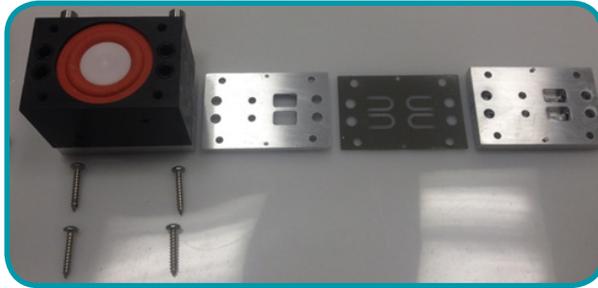
Before beginning valve disassembly, it is important to note that if improperly assembled the pump will malfunction and little or no air will be pumped. Mesa suggests drawing a line, or witness mark, across the entire face of the pump body. Doing this will make it very difficult to commit a misalignment error if the marks are exactly aligned during re-assembly. Do not draw lines on the face containing the motor nor the mounting studs.



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## Step 5

Starting on either side of the pump, remove 4 screws from the valve upper plate, lift off, and set aside. The valve plate alignment pins are pressed into the plate. Do not attempt to remove them. Carefully remove the valve, which may be lightly adhered to the upper or lower plate. Be extremely careful as this component is very thin. Set aside for inspection. Next, remove the valve lower plate. This component is usually a tight fit and a tool may be required to separate. Set aside, taking care to remove and retain the four "O" rings. Repeat the same procedure on the other side of the pump.



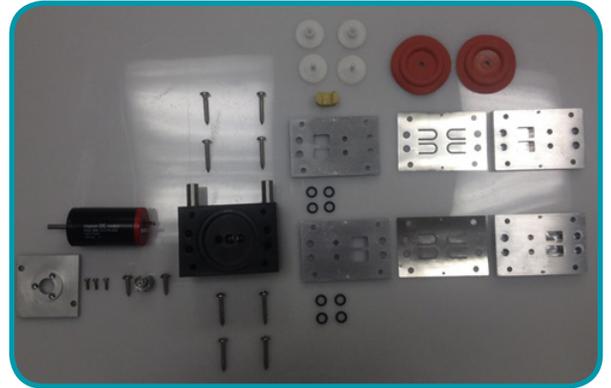
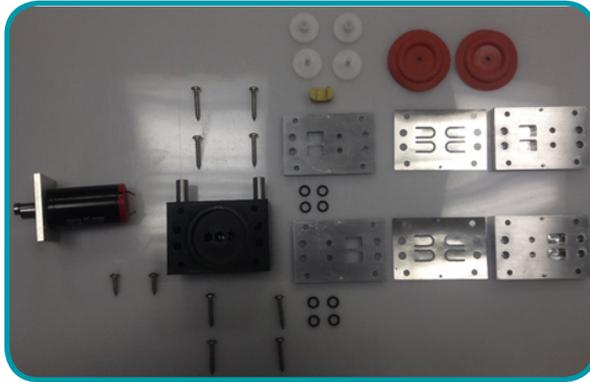
## Step 6

All visible metal parts should be bright and clean, completely free of corrosion or dirt. The leaves of the valve should be nearly flat or only slightly curved, and should be free of chips or cracks. If the valves are not perfect, they should be replaced. If they are dirty, they should be carefully wiped clean with a fresh, lint free cloth.



## Step 7

The diaphragms are removed by grasping the diaphragm retainer between the thumb and forefinger and rotating in a counter-clockwise direction when looking down at it. The other hand is used to grasp the same component on the opposite side. In this manner, one of the retainers may be removed. The remaining retainer is removed by inserting a finger through the bearing hole and forcing the yoke against an inside wall. Set these components aside for inspection. The diaphragms may now be pulled from their recesses.



## Step 8

To inspect the condition of a diaphragm, grasp it across its diameter and pull in opposite directions. If any cracks in the surface are observed, the diaphragm must be discarded.

## Step 9

To install or re-install a diaphragm, insert the retainer into the diaphragm and slide the retainer bushing over the diaphragm retainer shaft. Seize the follower yoke with a pair of long nose pliers and insert it through the drive hole in the pump housing. Align the threaded hole in the yoke, such that the diaphragm assembly may be inserted through its guide hole in the pump body and screwed into the yoke. Grasp the diaphragm retainer between the thumb and forefinger and rotate clockwise 2 turns. The diaphragm will be lying on top of the pump body. Leave it that way, for the moment. Prepare the opposite diaphragm assembly and screw it into the yoke 2 turns, holding each assembly between the thumb and forefinger of each hand. Each diaphragm may now be inserted into its respective recess. The edges of the disks are to be tucked into the recess in the pump body. Looking through the drive hole, align the yoke by eye so that you are looking into the bearing drive recess and align it such that it will receive the eccentric bearing and is parallel to the pump sides and square to the face. Now complete tightening the loose diaphragm retainers to the yoke and check alignment. Now, install the 8 "O" rings into the body and set the assembly aside.

## Step 10

Lay the valve upper plate face down on work surface. Lay the valve upper plate onto the face of the pump using the guide pins for alignment. If it is a used valve and the leaves have curved, be certain that the curve is toward the round holes in the valve plate. Lay the flat surface of the valve lower plate on top of the valve using the guide pin holes for alignment. Check to see that the witness mark is aligned. If not, raise the lower valve plate and re-align. Place the valve assembly onto the pump body. Press it home into the diaphragm recess and align the witness marks on the valve plates with those on the body. Install the four securing screws but do not fully tighten yet. Assemble and install the other valve components to the body in the same manner. All 8 of the valve plate screws may now be tightened.

## Step 11

Place the motor assembly into the hole in the pump body and rotate it until the bearing engages the opening in the yoke. The motor plate will not lie flat to the body unless the bearing is engaged in the yoke. Once this is accomplished, align the two screw holes in the motor plate to the screw holes in the pump body. Re-install the two motor plate screws. Before fully tightening the screws, centralize the motor plate on the pump body.

## Final procedures

Re-install the pump in the instrument and set up a run. When the pump comes on, ensure that it is drawing air through the instrument. If not, then the intake and exhaust pipes have been reversed. Place the suction hose onto the suction side of the pump and proceed to verify proper operation.

It is highly recommended to run a 24 hour burn-in of a rebuilt pump to allow the diaphragms to settle. Not following this procedure may lead to a tendency to draw 10 to 15% higher current during the first 24 hours.

When reinstalling a rebuilt pump for the first time, there may be a delay of up to 30 seconds before the pump "turns over". This is within normal limits, but should only occur, if at all, during the first start up. If 30 seconds has been exceeded, shut down at once. The assembly procedures have not been correctly followed. Check the pre-convoluting of the diaphragms.

If the pump runs but there is little or no air flow, check to ensure that one of the valve assemblies has not been reversed. If this has occurred, one side of the pump will be drawing air while the other side is pushing. This can occur if witness marks were not properly scribed onto the pump body prior to disassembly.

Recalibration of a PQ100 or PQ200 is not required after the rebuilding of the pump, but in following good practice, it is always wise to verify flow calibration after replacing a major component.