SERVICE MANUAL
VXMNAL – MINI ANALOG
VXMNFS – MINI FIXED SPEED
VXMNDG – MINI DIGITAL
VXMNPS – MINI PULSING
MINI VORTEX MIXERS

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Page No.

CHAPTER 1 GETTING STARTED

CHAPTER 2 TROUBLESHOOTING

CHAPTER 3 MAINTENANCE PROCEDURES

CHAPTER 4 FINAL TESTING

1.1 INTRODUCTION

This calibration service manual contains the information needed to perform routine maintenance and calibration on Ohaus Mini Vortex Mixers. Familiarity with the unit's Instruction Manual is assumed. The contents of this manual are summarized below:

Chapter 1 Getting Started – Contains information on service facilities, tools and test equipment, specifications, and the control functions of the Mini Vortex Mixers.

Chapter 2 Troubleshooting – Contains a diagnostic guide and error code table.

Chapter 3 Maintenance Procedures – Contains preventive maintenance procedures, calibration procedures, and spare part replacement procedures.

Chapter 4 Final Testing – Contains a HI-POT and Pre Packaging Test.

1.2 Definition of Signal Warnings and Symbols.

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions, and false results.

Signal Words

WARNING for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.

CAUTION for a hazardous situation with low risk, resulting in damage to the device or the property, loss of data, or minor injuries if not avoided.

Attention (no symbol)
for important information about the product.

Note (no symbol)
for useful information about the product.

Warning Symbols

 General Hazard

 Electrostatic discharge sensitive

 Electric Shock Hazard

 Hot surface

1.3 Safety Precautions

CAUTION: Read all safety warnings before installing, making connections, or servicing this equipment. Failure to comply with these warnings could result in personal injury and/or property damage. Retain all instructions for future reference.

- AC mains powered:

  - Verify that the local AC power supply is within the input voltage range printed on the equipment's data label. - Only connect the AC power cord to a compatible grounded electrical outlet.

- Do not position the Mini Vortex Mixer such that it is difficult to disconnect the power cord from the power receptacle.
- Only run unit on a sturdy, clean work surface
- This equipment is intended for indoor use and should only be operated in dry locations.
- Operate the equipment only under ambient conditions specified in the user instructions.
- Do not operate the equipment in hazardous or unstable environments.
- Disconnect power from the equipment before cleaning or servicing the equipment.
- Service should only be performed by authorized personnel.
- Use electrostatic protection measures when handling the electronic components.
- Never run the Mini Vortex Mixer without all 4 feet firmly attached.
- Do not run the unit with any cracked or broken flasks.

1.4 SERVICE FACILITIES

To service a Mini Vortex Mixer, the service area should meet the following requirements:

- Should be temperature controlled and meet Mini Vortex Mixer specifications for temperature and environmental requirements.
- Must be free of vibrations such as fork lift trucks close by or large motors.
- Area must be clean and free of excessive dust.
- Work surface must be stable and level.
- No lubrication or other technical user maintenance is required.
- Should be given care normally required for any electrical appliance.
- Avoid wetting or unnecessary exposure to fumes.
- Do not use a cleaning agent or solvent that is abrasive to plastics on the front panel.
- Always ensure the power is disconnected from the unit prior to any cleaning.
- Ensure the unit is plugged into the appropriate power source (120 or 230V)

1.5 TOOLS AND TEST EQUIPMENT REQUIRED

The service shop should contain the following equipment:

1. Standard hand tools.
2. Standard Electronics tool kit.
3. Soft, lint-free cleaning cloth and alcohol wipes
4. Anti-static wrist strap and mat
5. #2 Philips Head Screwdriver
6. Small Flathead Screwdriver
7. 12 inch pound torque driver.
8. California Instruments Tester or equivalent 230V power source.
9. Cup Head accessory
10. Trimpot Tool- Vishay Spectrol or equivalent.
11. Digital Photo Tachometer
12. Strobe
13. Loctite #248
14. Loctite #411
15. Loctite Applicator
16. Safety Glasses
17. Gloves (Rubber, Latex, or similar material)
18. Cotton Swabs
19. Megger 230315 HIPOT Insulation Tester or equivalent.

1.6 SPECIFICATIONS

Overall dimensions (L x W x H): 8.3 x 4.8 x 6.5” (21.0 x 12.3 x 16.5 cm)

Electrical (50/60 Hz): 120V: 1.2 amps, 135 watts
230V: 0.6 amps, 135 watts

Speed Ranges:	Analog	Fixed Speed	Digital	Pulsing
120V	300-3200 RPM	3200 RPM	500-3000 RPM	500-3000 RPM
230V	300-2500 RPM	2500 RPM	500-2500 RPM	500-2500 RPM

Orbit: Pulsing Units: 2.5mm (0.098”)
Analog/Fixed Speed/ Digital Units: 4.9mm (0.194”)

Duty Rating: All Units: Intermittent Duty

	Analog	Fixed Speed	Digital	Pulsing
Controls:	See detail in section 1.7	None	See detail in section 1.7	See detail in section 1.7

Ship Weight: All Units: 10lbs (4.5kg)

1.6.1 Admissible Ambient Conditions: Use only in closed rooms

Indoor use only.

Altitude	0 to 6,562 ft (2000 M) above sea level.
Temperature range	4 ºC to 40 ºC (39.2º to 104 ºF)
Non-Operating Temperature Range	-20 to 65 ºC (-4 to 149 ºF)
Atmospheric humidity	20% to 85% relative humidity, non-condensing
Non-Operating Humidity	20% to 85% relative humidity, non-condensing
Installation Category	II
Voltage fluctuations	Mains supply voltage fluctuations up to +/- 4% of the nominal range
Over voltage category	II
Pollution degree	2
Power load	135W
Current consumption	1.2 A (120V) or 0.6 A (230V)
Power supply voltage	115 V – 125 V or 221 V – 239 V

1.7 CONTROLS

CONTROL PANEL – DIGITAL AND PULSING UNITS

The front panel of the Digital/Pulsing Mini Vortex Mixer contains all the switches, controls and displays needed to operate the unit.

A. 3-way rocker switch: Auto/standby/on rocker switch starts/stops the vortexing function.

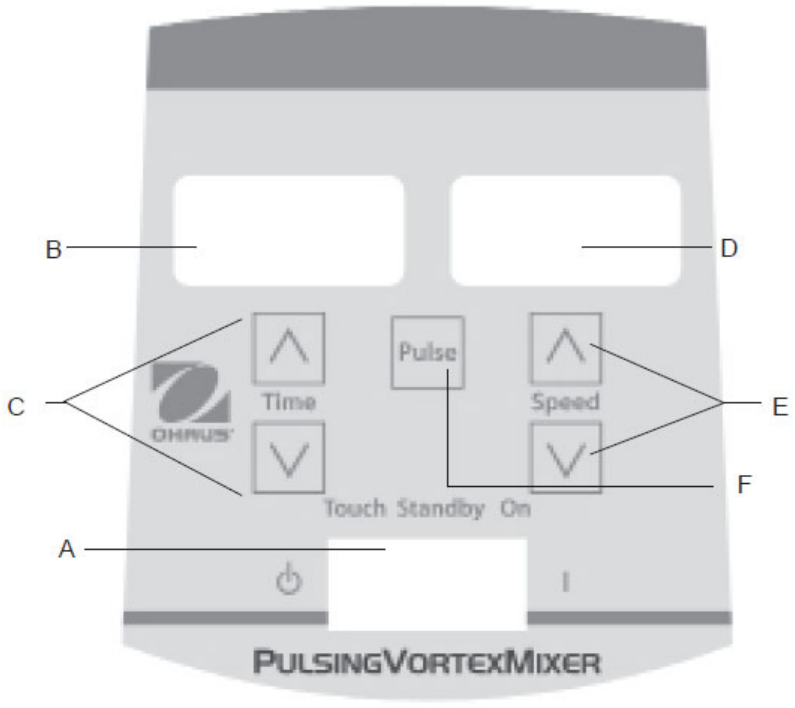
B. Time display: Displays accumulated time (continuous mode) or how much time is remaining (timed mode). The display range is from 0 to 9,999 minutes in one (1) second increments. The display will indicate minutes and seconds until the timer reaches 99 minutes and 59 seconds (99:59), then the display will automatically display minutes up to 9,999.

C. Up/down arrows for set-point control.

D. Speed display: Displays the speed of the Mini Vortex Mixer.

E. Up/down arrows for set-point control.

F. Pulse button: Starts the pulsing mode. (Only on pulsing units)



* Same controls for the Digital Mini Vortex Mixer but without the 'pulse' button.

CONTROL PANEL – ANALOG UNITS

A. 3-Way Rocker Switch: Touch/off/on rocker switch starts/stops the vortexing function.

B. Speed Control: The speed control knob controls the vortexing speed. User should turn knob clockwise until the vortexer reaches the desired speed.

C. Pressure Switch: Press down on the cup head to activate this switch for touch mode.

2.1 TROUBLE SHOOTING

This section of the manual contains troubleshooting information. To isolate specific problems, use Table 2-1, Problem Solver. Follow all directions step by step. Make certain that the work area is clean. Handle vortex mixer components with care. Use appropriate Electro-Static Protection Devices.

2.1.1 General Procedures for Troubleshooting

1. Do the most obvious, user-level remedies.
2. **Visual Check:**
   - Clean the unit and operating table before evaluating any mechanical problems. Remove any debris inside the Housing.
   - Check condition of the knobs, switch, etc.
   - Examine the Housing for dents
3. Check that internal parts are clean and free of debris.
4. Use the Problem Solver (Table 2-1) to locate the symptom. Follow the suggested remedies in the order they appear.

If a problem arises that is not covered in this manual, contact Ohaus: www.ohaus.com.

2.2 PROBLEM SOLVER

TABLE 2-1. PROBLEM SOLVER

Symptom	Possible Cause	Remedy
Unit will not run.	Mechanical obstruction or Motor obstruction.	Remove obstruction and press down on cup head several times to confirm no obstruction exists. If problem persists, please contact your Ohaus representative for repair.
Unit is excessively noisy.	Sensor fan misaligned or Motor misaligned.	This error cannot be fixed by the end user. Please contact your Ohaus representative for repair.
Plastic Red foot is detached.	Foot was damaged from use or transportation of the unit.	Reattach the red plastic foot with reference to section 3.4.
Units will not reach desired speed. (Unit is running too fast or too slow)	Unit is not properly calibrated.	Recalibrate the unit using the recalibration procedure in section 3.3. If problem persists, please contact your Ohaus representative for repair.

3.1 PREVENTIVE MAINTENANCE

Ohaus Mini Vortex Mixers should be carefully handled; stored in a clean, dry, dust-free area; and cleaned periodically. Follow these precautionary steps:

– When a Mini Vortex Mixer has had chemicals or liquids spilled on it, all exterior surfaces should be cleaned as soon as possible with a damp cloth.

– Do not leave a sample on the Mini Vortex Mixer when it is not in use.

3.1.1 Preventive Maintenance Checklist

The Mini Vortex Mixer should be inspected and checked regularly, as follows:

1. Inspect and clean the area around the top plate.

2. Clean the outside using a damp cloth.

CAUTION
DO NOT USE CHEMICAL CLEANERS OR SOLVENTS OF ANY TYPE. SOME CLEANERS ARE ABRASIVE AND MAY AFFECT THE FINISH.

3. Check the Power Cord for broken or damaged insulation.

4. Make a visual inspection for faulty connectors, wiring, and loose hardware.

3.1.2 Recalibration General Procedure

1. Be aware of the tool requirement for each step.

2. After recalibrating the Mini Vortex Mixer perform all the final tests in Chapter 4 to confirm the recalibration was performed correctly and the unit is completely functional.

3. Parts or assemblies may be updated without any updates to this manual. Always inspect the unit before disassembly for any major changes and reassemble accordingly.

3.2 OPENING THE MINI VORTEX MIXER

Common hand tools are sufficient to disassemble the Mini Vortex Mixer.
Turn the Mini Vortex Mixer off and unplug the power cord before you begin.

Warning: Disconnect from power supply and allow the Mini Vortex Mixer to stabilize!

Use electrostatic protection when servicing!

Electrostatic damage is difficult to detect, because the faults it causes are not clear-cut. To avoid electrostatic damage during production, conducting floors, controlled air humidity, and EMC mats are used. When servicing the unit it is also advisable – as soon as the instrument is opened – to neutralize electrostatic charges.

1. Remove 4 screws shown below from the bottom of the unit using a 12 in-lb torque driver or #2 Philips head screw driver and then displace the bottom housing. When reinstalling, use Loctite #248 on the threads.

2. Workmanship Check:

a. Look inside the unit to ensure wiring routing is away from motor and heater.

b. Look at outside the unit to ensure unit is free of scratches, nicks, and dents.

Step 1

3.3 RECALIBRATING THE MINI VORTEX MIXER (VXMNAL)

1. Complete all 3 steps in ‘Opening the Mini Vortex Mixer’.

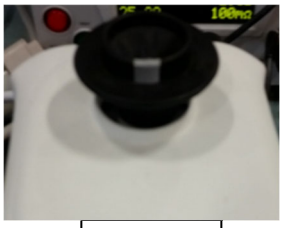
Step 2


Step 3

2. Turn unit to the “10” position and set the switch to “touch” mode.

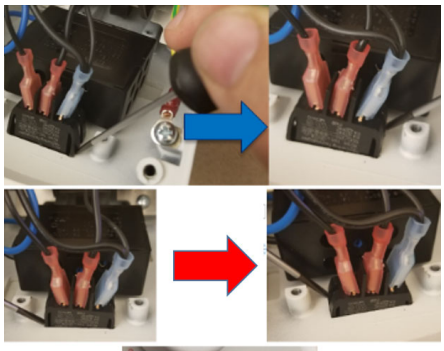
Step 4

3. Press down on the head mount of the unit to see if it will run in “touch” mode. When released, the unit should stop running.


Step 6

4. Set the switch to the “on” mode and let the unit run for 30 minutes. If the speed control does not function, check that it is wired correctly and that the motor spins freely.

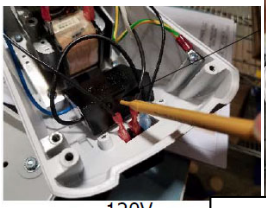
Step 7

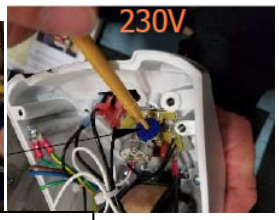


5. Let unit cool for 10 minutes.

6. Attach the cup head that has a piece of reflective tape on its side.

7. For 120V units only, the switch must be displaced before calibration. To remove the switch, disconnect the power cord and then press each of the four switch mounting tabs inward while simultaneously pushing down on the switch. The switch should visibly prop out of the housing.


120V



Step 8

8. Place a Vishay Spectrol Trimpot Tool (or equivalent) into the slot of the speed control.

9. Turn the knob to “1” position and turn the switch to the on mode.

Step 9

10. While the cup head is rotating, calibrate speed to 500 RPM +/- 150 RPM using the digital photo tachometer.

Step 10

11. Turn the unit to the “5” position and verify it is running approximately 1250 RPM +/- 250 RPM using the digital photo tachometer.

Step 11

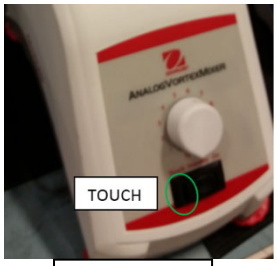
12. Turn the unit to the “10” position and verify it is running approximately 3000 RPM +500/-0 RPM using the digital photo tachometer.

Step 12

13. Turn the speed control down as low as possible, the speed should drop. Note: the head mount may stop moving and then restart.

Step 13

14. If running correctly, turn unit to “standby” mode then to “touch” mode.



Step 14

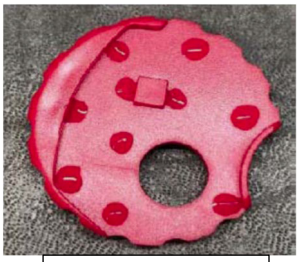
15. Press down on head mount to see if the unit will run in “touch” mode. When released the unit should stop moving.

16. Turn the rocker switch back to “standby” mode.

Step 15

3.4 REATTACHING/REPLACING THE RED FEET (All VXMN units)

1. Using the applicator, apply 10 drops of Loctite 411 spread out on the base of the foot as shown.

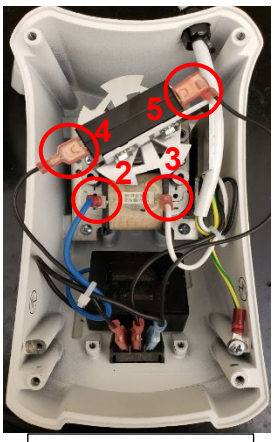


3.4: Step 1

2. Place the foot on the appropriate corner of the unit and manually press it into place until the foot is sufficiently matted.

3. Repeat for other feet of the unit as necessary.

3.5 REPLACING THE MOTOR ASSEMBLY (VXMNAL/FS)



3.5: Steps 2-5

1. Complete all 3 steps in section 3.2: Opening the MiniVortex Mixer.

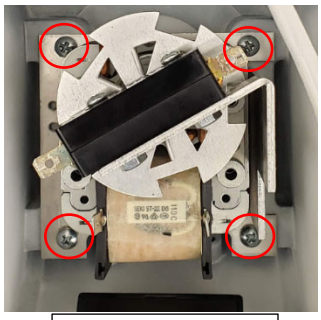
1a. If working with fixed speed unit (VXMNFS), skip steps 2 and 4.

2. Disconnect the FASTON terminal (from blue wire of speed controller assembly) on the left terminal of the motor.

3. Disconnect the red FASTON terminal (from the white wire of the power cord) on the right terminal of the motor.

4. Disconnect the red FASTON terminal (from left terminal of rocker switch) on the left terminal of the cherry switch.

5. Disconnect the red flag FASTON terminal on the right terminal of the cherry switch.



3.5: Steps 6-7

6. Remove the 4 screws holding the motor assembly in place using a 14 in-lb torque driver or #2 Philips head screw driver. Apply Loctite #248 when reinstalling.

7. Ensuring that the black cup head is detached, remove the motor assembly and replace it with the spare motor assembly. Reinstall the 4 screws, applying Loctite #248 to the threads.

8. Using the reverse procedure of disassembly, reconnect the wires and reassemble the unit.

3.6 REPLACING THE FRONT PANEL AND HEX NUT (VXMNAL)

3.6: Step 2

1. Complete all 3 steps in section 3.2: Opening the MiniVortex Mixer.

2. Remove the front knob. Use a 5/64 Allen wrench to remove the set screw in the hole in the knob, then slide the knob off of the speed controller shaft.

3. Displace the rocker switch. See step 7 of section 3.3: Recalibrating the MiniVortex Mixer (VXMNAL/FS) for instructions.

4. Use a blade or thin wedge to peel off the front panel and remove it.

3.6: Step 4

5. Use a 1/2 nut driver to remove the hex nut on the speed controller shaft.

6. Replace the hex nut with its spare part.

7. Replace the front panel, fitting the new part and pressing it in so it sets onto the unit.

8. Press in the rocker switch. Ensure all wires are connected properly.

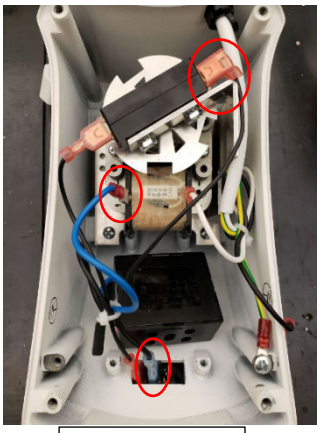
9. Use the reverse process of disassembly to reassemble the unit.

3.6: Step 5

3.7 REPLACING THE SPEED CONTROLLER (VXMNAL)

1. Complete steps 1-5 of section 3.6: Replacing the Front Panel and Hex Nut to disassemble the front of the unit. The speed controller should now move freely within the unit.

2. Disconnect the blue FASTON connector from the middle terminal of the rocker switch. Disconnect the red flag FASTON connector from the right terminal of the cherry switch. Disconnect the FASTON connector (blue wire) from the left terminal of the motor. This should allow the speed controller to be removed.

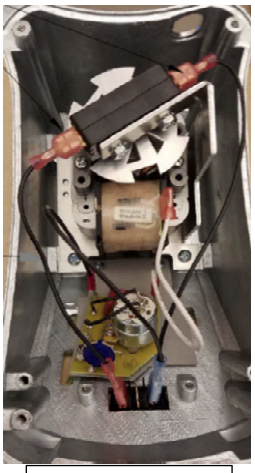


3.7: Step 2

3. Replace the speed controller with its spare part, feeding the shaft through the unit with the wires on the left and the calibration dial visible from the front. Use the reverse process of step 6 to reconnect the wires.

4. Use the reverse process of disassembly to reassemble the unit. Refer to steps 6-9 of section 3.6: Replacing the Front Panel and Hex Nut to replace these parts with the new spares.

NOTE: In the 230V Analog unit, the speed controller will appear differently, as shown. The disassembly process is similar.

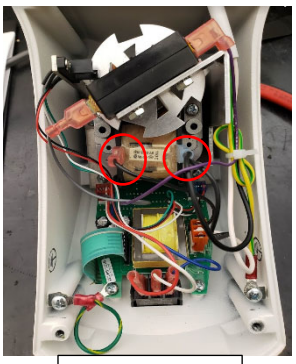


3.7: NOTE

3.8 REPLACING THE MOTOR ASSEMBLY (VXMNDG/PS)

1. Complete all 3 steps in section 3.2: Opening the MiniVortex Mixer.

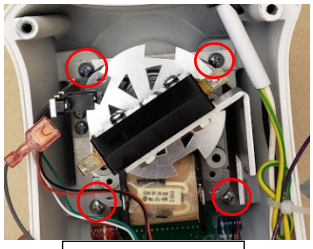
2. Disconnect the red FASTON connector from the left terminal of the motor. Disconnect the blue FASTON terminal from the right terminal of the motor.



3.8: Step 2

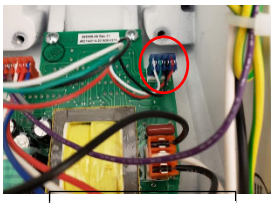
3. Use a #2 Phillips head screw driver to remove the four screws securing the motor. Apply Loctite #248 when reinstalling.

4. Ensuring that the black cup head is detached, displace the motor and disconnect the blue MTA connector from the upper right-hand terminal of the circuit board. Remove the motor.



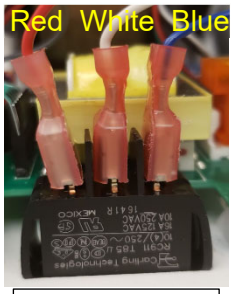
3.8: Step 3

5. Disconnect all three FASTON connectors from the rocker switch. Remember that the order of wire color from left to right is red, white, blue when reinstalling.



3.8: Step 4

6. Disconnect the red MTA connector from the upper left-hand terminal of the PCB. Remove the motor and all attached wiring from the housing.

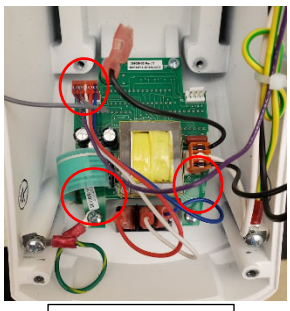


3.8: Step 5

7. Replace the motor assembly with the spare part, using the reverse process of disassembly to rewire/reassemble the unit.

3.9 REPLACING THE PROCESSOR CONTROL BOARD (VXMNDG/PS)

1. Complete steps 1-4 of section 3.7: Replacing the Motor Assembly (VXMNDG/PS).



3.9: Step 2

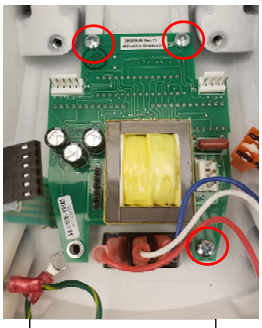
2. Disconnect the orange MTA connector from the right-side terminal of the PCB. Disconnect the red MTA connector from the upper left-hand terminal of the PCB. Disconnect the ribbon cable from the left-side terminal of the PCB.

3. Use a #2 Phillips head screw driver to remove the bottom left-hand screw of the PCB, and displace the ground wire ring terminal from the PCB. Be sure to reconnect the ground wire when reinstalling this screw.

3.9: Step 3

4. Remove the remaining three corner screws from the PCB. Apply Loctite #248 to all four screws when reinstalling.

5. Install the new spare PCB using the four #6-32 X 3/8 screws. Ensure that the two 1/8” nylon spacers sit properly under the board at the two bottom screws. Use the reverse process of disassembly to reconnect all wires and reassemble the unit.

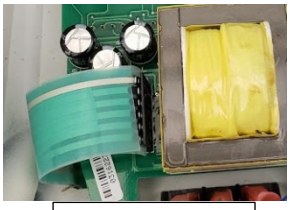


3.9: Step 4

3.10 REPLACING THE FRONT PANEL (VXMNDG/PS)

1. Complete all 3 steps in section 3.2: Opening the MiniVortex Mixer.

2. Disconnect the ribbon cable from the left-side terminal of the PCB.

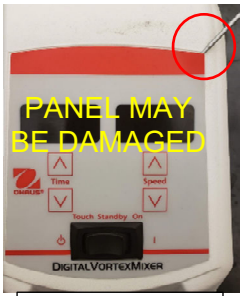


3.10: Step 2

3. Refer to step 5 of section 3.8: Replacing the Motor Assembly (VXMNDG/PS) to disconnect all three FASTON connectors from the rocker switch.

4. Remove the rocker switch. See step 7 of section 3.3: Recalibrating the MiniVortex Mixer (VXMNAL/FS) for instructions.

5. Use a blade or thin wedge to peel off the front panel. <u>The display on the panel will crack in this process. Only proceed if a spare panel is available.</u>



3.10: Step 5

6. Install the replacement front panel, slipping the ribbon cable through the respective slot in the face of the unit and pressing the panel in so the adhesive sets. Press in the rocker switch.

7. Use the reverse process of disassembly to reassemble the unit.

4.1 FINAL TESTING

After recalibration of the Mini Vortexer, perform the Pre Pack Test and the HI-Pot Test.

NOTE:
Make sure the test area is free from drafts and the surface the Mini Vortexer rests on is level and vibration-free.

4.2 Pre Pack Test

1. Turn the analog knob to “10” and let the unit run for 1 minute.
2. Listen for any noise, if there is any rubbing, clicking or other unusual sounds, the unit needs to be recalibrated or it is completely dysfunctional.
3. To ensure that the unit does not run continuously in “TOUCH” mode, power unit on in “TOUCH” mode and observe that the unit does not run automatically after closing up the unit by attaching the bottom plate with the screws.

4.3 HI-POT Test

1. Verify the Hi-Pot Tester is in the ‘OFF’ position and the TESTER GROUNDED indicator is ‘ON’, the LEAKAGE SENSITIVITY CONTROL is in the ‘12MA’ position, the GROUND CHECK/BYPASS switch is in the ‘GROUND CHECK’ position, and the meter reads ‘0 VOLTS’.
2. Plug the unit to be tested into OUTPUT plug located on the front of the Hi-Pot Tester.
3. Set the speed position of the unit to “5” and test in both the “ON” and “TOUCH” mode.
4. Press the CONT push button, the HV ON indicator should come "ON".
5. Slowly increase the VOLTAGE CONTROL knob to ‘1400’ volts. This potential must be maintained for two seconds with any failure conditions (there is an audible buzzer and FAILURE indicator that will indicate a failure condition).
6. Press the HV OFF push button, the HV ON indicator should go "OFF".
7. Adjust the VOLTAGE CONTROL knob to the "0" position.
8. Press the On/Off rocker switch to the "Off" position.
9. Disconnect black RETURN test probe.
10. The AC Hi-pot testing of the unit is now complete and the unit can be disconnected from the tester. If a failure condition occurs, the source of the failure must be corrected and the proper production records maintained. If no failure condition occurs, the unit has passed this test and the proper production records must be maintained.