This manual is for the installation and service of Tech West’s WhirlWind Pumps.

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1. WHIRLWIND LOCATION REQUIREMENTS

The WhirlWind location should be level, accessible and well ventilated.

If the WhirlWind will be located in a confined space, provide cross ventilation and install an exhaust fan.

The following utilities are required:

(a) **Cold Water Supply**  Install a separate 1/2” cold water branch for the WhirlWind water intake(s). This will cool and lubricate the shaft seal. Water pressure should be between 25 and 55 psi (water must remain on during operation) or shaft seal damage will occur.

(b) **Waste Disposal**  The WhirlWind will exhaust both vapor and liquid waste. Provide exhaust vent sized to 2” in diameter and a waste drain which complies with local code.

(c) **Vacuum Line**  The main vacuum line from the operatories must connect to the WhirlWind vacuum pump intake manifold.

(d) **Electrical**

(1) Line voltage must be within the limits of Table 1 below. (Install a “buck-boost transformer” if line voltage is not between these values.) Provide a separate line for each pump motor. Circuit breaker switches must be 20 amp.

<table>
<thead>
<tr>
<th>PUMP VOLTAGE RATING</th>
<th>MIN VOLTAGE RATING</th>
<th>MAX VOLTAGE RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>230 v</td>
<td>208 v constant</td>
<td>240 v constant</td>
</tr>
<tr>
<td>115 v</td>
<td>110 v constant</td>
<td>130 v constant</td>
</tr>
</tbody>
</table>

(2) Local code may require you to provide one quick disconnect (safety switch) for each pump motor.

(3) The WhirlWind is controlled by a 24 volt circuit. For remote control, provide one 18/3 jacketed cable for each pump motor.
WHIRLWIND PUMP
INSTALLATION

2. INSTALLATION STEPS

(a) Check the shipping carton for damage. This could detect damage to the unit which might otherwise be overlooked.

(b) Remove the WhirlWind from its shipping carton. Inspect the unit for damage. (Single WhirlWind’s are shipped bolted to a pallet. This pallet is intended for shipping use only and should be discarded).

(c) Inventory your Hook-Up Kit. Check its contents against the inventory sheet included. These items will be used in the remaining steps.

(d) Mount the WhirlWind. To dampen vibration, ensure rubber isolators are installed on each WhirlWind Pump.

Refer to the schematic diagram of Figure 1 for steps (e) (f) and (g).

(e) Connect the cold water supply. See Figure 2. Turn the water on and check for leaks in the water control assembly.

(f) Make the necessary waste connections. Figures 3 and 4 show typical installations. To install a Tech West Exhaust Separator or Water Recycler see the applicable installation sheet.

(g) Connect the main vacuum line. For Single WhirlWind’s, connect flexible hose to the pump intake manifold (Figure 5). For Dual and Triple WhirlWind’s, connect to the vacuum intake manifold (Figure 6).

Refer to the wiring diagram of Figure 7 for steps (h) and (l). Detailed wiring diagrams are on the inside of each pump relay panel cover plate.

(h) Connect remote control 18/3 jacketed cable to each pump relay panel. Use wire connectors which provide secure mechanical connections. See Figure 8.

(i) Connect to line voltage (via safety switch(es) if required by local code). Use 12 gauge THHN grade wire and approved conduit for permanent wiring. See Figure 9. (Single WhirlWind pumps may operate on either 115 volt or 230 volt lines. For terminal changing instructions see inside of relay panel cover plate.

(j) Turn on the WhirlWind. Check the pump(s) for leaks and the vacuum level following the instruction in “Weekly Servicing” page 8.
Figure 1: Plumbing Schematic


Figure 2: Water Connection
Figure 3: Typical Dual WhirlWind Vacuum Installation

Figure 4: Sink Cabinet Installation
Figure 5: Vacuum Connection For Single WhirlWind Pump

Figure 6: Vacuum Connection For Dual WhirlWind Pump

GLUE ALL EXHAUST HOSE CONNECTIONS SECURELY WITH PVC GLUE
Wiring Diagram Illustrates The Connections For a Dual WhirlWind Pump

Figure 7: Wiring Diagram

Figure 8: Remote Control Wiring
Figure 9: Line Voltage Connections
3. WEEKLY SERVICING

Refer to Figure 10 for the following steps.

(a) Clean vacuum filter bowl and screen. Turn the pump off and unscrew the vacuum filter bowl, rinse bowl and screen under cold water. Replace bowl or screen if damaged. Ensure gasket is in place in the filter bowl before reassembly.

(b) Flush the WhirlWind pump(s) and main vacuum lines with a non-foaming dental vacuum cleanser. Follow the cleanser manufacturer’s instructions.

(c) Visually inspect WhirlWind pump(s) for water leakage. Ensure that all hose clamps and water connections are tight.

(d) Check vacuum gauge level. Vacuum settings are adjusted at the factory according to table 3 below. To check the vacuum level, ensure that the pump is aspire only. If the vacuum level is out of adjustment, turn off the pump and remove the vacuum relief valve. Holding the phillips head screw in place, turn the “tension nut”.

One complete clock-wise turn of the tension nut will add 2 in. hg. to the vacuum level; one complete counter-clock-wise turn will subtract 2 in. hg. from the vacuum level.

<table>
<thead>
<tr>
<th>WHIRLWIND (HORSEPOWER)</th>
<th>1</th>
<th>1 1/2</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR ASPIRATION VACUUM LEVEL (INCHES OF MERCURY)</td>
<td>10</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

**WARNING: NEVER SET VACUUM LEVEL HIGHER THAN INDICATED IN TABLE 3**

Flush the entire vacuum piping system (all operatories) weekly. Use a non-foaming cleanser. If the WhirlWind cannot induce adequate air flow because of a blockage in the vacuum piping system, liquids and solids will not evacuate. Contact Tech West’s Customer Service for further details on maintaining your vacuum piping system.
<table>
<thead>
<tr>
<th>KEY</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BIM</td>
<td>BRASS PUMP IMPELLER 1 1/2 HP PUMP</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>WIA-100</td>
<td>WATER INJECTION ASSEMBLY, COMPLETE</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>PRC-100</td>
<td>115V/230V RELAY CONTROL BOX, COMPLETE</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>BPH</td>
<td>BRASS PUMP HOUSING</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>PSS-100</td>
<td>SHAFT SEAL</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>BIS</td>
<td>BRASS PUMP IMPELLER 1 HP PUMP</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>BIL</td>
<td>BRASS PUMP IMPELLER 2 HP PUMP</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>OR-5</td>
<td>5” RUBBER BASE PLATE ‘O’ RING SEAL</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>BBP</td>
<td>BRASS BASE PLATE</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>RFV-100</td>
<td>RUBBER FEET FOR VACUUM PUMP</td>
<td>3</td>
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</tbody>
</table>
### WATER INJECTION ASSEMBLY

<table>
<thead>
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<th>KEY</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>PVB-100</td>
<td>1/4&quot; VACUUM BREAKER</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>BRN-4-2</td>
<td>1/4&quot; MPT x 1/8&quot; MPT NIPPLE</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>PSV-115GC</td>
<td>115V 1/8&quot; SOLENOID VALVE/COIL</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>BN-125-CL</td>
<td>1/8&quot; BRASS CLOSE NIPPLE</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>VPS-125</td>
<td>1/8&quot; WATER STRAINER</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>BN-250-1.50</td>
<td>1/4&quot; X 1 1/2&quot; BRASS NIPPLE</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>PRT-250</td>
<td>1/4&quot; BLUE POLY TUBE</td>
<td>PER. FT</td>
</tr>
<tr>
<td>18</td>
<td>WIN-RP</td>
<td>1/4&quot; MPT INJECTION NOZZLE (FOR RECYCLERS ONLY)</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>WIN-2P</td>
<td>1/4&quot; INJECTION NOZZLE</td>
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WHIRLWIND MANIFOLD AND FILTER

<table>
<thead>
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<th>PART NO.</th>
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</thead>
<tbody>
<tr>
<td>18</td>
<td>VPG-100</td>
<td>30&quot; HG GAUGE</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>BN-750-CL</td>
<td>3/4&quot; BRASS CLOSE NIPPLE</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>VFA-40</td>
<td>3/4&quot; FILTER UNIT, COMPLETE</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>VFG-100</td>
<td>3/4&quot; RUBBER GASKET FOR BOWL</td>
<td>3</td>
</tr>
<tr>
<td>22</td>
<td>VFS-40</td>
<td>40 MESH SCREEN FOR 3/4&quot; FILTER</td>
<td>3</td>
</tr>
<tr>
<td>23</td>
<td>MG-100</td>
<td>MANIFOLD GASKET</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>VRV-100</td>
<td>VACUUM RELIEF VALVE W/ FITTING</td>
<td>1</td>
</tr>
<tr>
<td>25</td>
<td>VFB-100</td>
<td>3/4&quot; VACUUM FILTER BOWL</td>
<td>1</td>
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<tr>
<td>26</td>
<td>VPMA-100</td>
<td>MANIFOLD ASSEMBLY, COMPLETE</td>
<td>1</td>
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LOW VOLTAGE RELAY CONTROL BOX

<table>
<thead>
<tr>
<th>KEY</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
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</thead>
<tbody>
<tr>
<td>27</td>
<td>FH-100</td>
<td>FUSE HOLDER, PUMP</td>
<td>1</td>
</tr>
<tr>
<td>28</td>
<td>SBF-250</td>
<td>1/4 AMP SLOW BLOW FUSE</td>
<td>5</td>
</tr>
<tr>
<td>29</td>
<td>PT-100</td>
<td>24V TRANSFORMER, 30A</td>
<td>1</td>
</tr>
<tr>
<td>30</td>
<td>PR-100</td>
<td>24V RELAY CONTACTOR</td>
<td>1</td>
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<tr>
<td>-</td>
<td>RC-115</td>
<td>115V RELAY CONTROL, COMPLETE</td>
<td>1</td>
</tr>
<tr>
<td>-</td>
<td>RC-230</td>
<td>230V RELAY CONTROL, COMPLETE</td>
<td>1</td>
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</table>
SINGLE WHIRLWIND

<table>
<thead>
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<th>KEY</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
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</thead>
<tbody>
<tr>
<td>32</td>
<td>RFV-100</td>
<td>RUBBER FEET FOR VACUUM PUMP</td>
<td>3</td>
</tr>
<tr>
<td>33</td>
<td>PTA-100</td>
<td>P-TRAP ASSEMBLY</td>
<td>1</td>
</tr>
<tr>
<td>34</td>
<td>ES-1</td>
<td>EXHAUST SEPARATOR TANK</td>
<td>1</td>
</tr>
<tr>
<td>39</td>
<td>CVF-750</td>
<td>3/4&quot; CHECK VALVE</td>
<td>1</td>
</tr>
</tbody>
</table>

SINGLE PUMP UNITS REQUIRE EXHAUST SEPARATOR TANK TO MOUNT TO A WALL.
### DUAL WHIRLWIND PLATFORM

<table>
<thead>
<tr>
<th>KEY</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>BV-250</td>
<td>1/4&quot; BALL VALVE / FRESH WATER SUPPLY</td>
<td>2</td>
</tr>
<tr>
<td>32</td>
<td>RFV-100</td>
<td>RUBBER FEET FOR VACUUM PUMP</td>
<td>4</td>
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<tr>
<td>36</td>
<td>DCV-100</td>
<td>DUAL CHECK VALVE ASSEMBLY</td>
<td>1</td>
</tr>
<tr>
<td>33</td>
<td>PTA-100</td>
<td>P-TRAP ASSEMBLY</td>
<td>1</td>
</tr>
<tr>
<td>35</td>
<td>ES-2</td>
<td>EXHAUST SEPARATOR TANK</td>
<td>1</td>
</tr>
<tr>
<td>39</td>
<td>CVF-750</td>
<td>3/4&quot; CHECK VALVE</td>
<td>2</td>
</tr>
<tr>
<td>KEY</td>
<td>PART NO.</td>
<td>DESCRIPTION</td>
<td>UNIT</td>
</tr>
<tr>
<td>-----</td>
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<td>-----------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>31</td>
<td>BV-250</td>
<td>1/4&quot; BALL VALVE / FRESH WATER SUPPLY</td>
<td>3</td>
</tr>
<tr>
<td>32</td>
<td>RFV-100</td>
<td>RUBBER FEET FOR VACUUM PUMP</td>
<td>6</td>
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<td>37</td>
<td>TCV-100</td>
<td>TRIPLE CHECK VALVE ASSEMBLY</td>
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<td>33</td>
<td>PTA-100</td>
<td>P-TRAP ASSEMBLY</td>
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<tr>
<td>38</td>
<td>ES-3</td>
<td>EXHAUST SEPARATOR TANK</td>
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<tr>
<td>39</td>
<td>CVF-750</td>
<td>3/4&quot; CHECK VALVE</td>
<td>3</td>
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TRIPLE WHIRLWIND PLATFORM
<table>
<thead>
<tr>
<th>Service scheduled for:</th>
<th>Service items needed:</th>
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</table>
Troubleshooting Chart
Single Vacuum

1. **Does Vacuum Pump Run?**
   - **YES**: Is there sufficient suction?
     - **YES**: Is there excessive vacuum?
       - **NO**: Does pump run continuously?
       - **YES**: Go to the next page.
     - **NO**: Repair vacuum leaks.
   - **NO**: Clean or replace filter.

2. **Are there any vacuum leaks at the pump?**
   - **YES**: Clean or replace filter.
   - **NO**: Remove vacuum inlet line from pump. If there is good suction at pump, but little or none in system, the system is clogged or contains leaks.

3. **Is the office vacuum piping system faulty?**
   - **YES**: Adjust to 10" hg.
   - **NO**: Is the vacuum relief valve set too low? (Normal level is 10" hg)
     - **YES**: Contact Tech West.
     - **NO**: Check usage charts for maximum number of simultaneous users. Upgrade if necessary.

4. **Is there sufficient suction?**
   - **YES**: Is vacuum relief filter clogged?
     - **YES**: Check for adequate ventilation and proper voltage.
     - **NO**: Does thermal protector shut the pump down?
       - **YES**: Is circuit breaker tripping?
         - **NO**: Repair vacuum leaks.
         - **YES**: Contact Tech West.
     - **NO**: Clean or replace filter.
   - **NO**: Is vacuum relief filter or intake strainer screen clogged?

5. **Is vacuum relief filter clogged?**
   - **YES**: Clean or replace filter.
   - **NO**: Adjust to 10" hg.

6. **Is the vacuum relief valve set too high (above 10" hg)?**
   - **YES**: Contact Tech West.
   - **NO**: Check usage charts for maximum number of simultaneous users. Upgrade if necessary.

7. **Is there excessive vacuum?**
   - **YES**: Contact Tech West.
   - **NO**: Adjust to 10" hg.

8. **CHECK FOR:***
   - 1. Proper seating of strainer bowl. (D) O-ring may be pinched.
   - 2. Proper functioning vacuum relief valve. (A) Valve may be sticking open.
   - 3. Incorrectly sized or defective breaker.
   - 4. Check for proper wire gauge size.
   - 5. "OPEN" water supply valve.
   - 6. Clogged water strainer.
   - 7. Clogged water regulator.
   - 8. Clogged recycler line.

9. **Is there adequate water supply or water pressure?**
   - **YES**: Check usage charts for maximum number of simultaneous users. Upgrade if necessary.
   - **NO**: Replace water solenoid valve if proper voltage exists.

Vacuum Component Diagram

- **Left Side View**
- **Right Side View**

1. **A**
2. **B**
3. **C**
4. **D**
5. **E**
6. **F**
7. **G**
8. **H**
9. **I**
10. **J**
11. **K**
12. **L**
**Vacuum Wiring Diagram**

**Dual Voltage**

**Single Vacuum**

---

**DOES VACUUM PUMP RUN?**

- **NO**
  - **Is there sufficient voltage at disconnect box?**
  - **NO**
    - **Check for broken or loose power line or excessive voltage drop across line.**
  - **YES**
    - **Is there proper voltage at input terminals?**
    - **NO**
      - **Low voltage or improperly jumpered pump.**
      - **NO**
        - **Does relay chatter?**
        - **YES**
          - **Replace remote switching or replace faulty wiring.**
        - **NO**
          - **Defective fuse or transformer or faulty connection within electrical box.**
      - **YES**
        - **Does pump run with remote switching bypassed (red & blue low voltage wires connected)?**
        - **NO**
          - **Replace relay.**
          - **NO**
            - **Do relay contacts close?**
            - **YES**
              - **Contact Tech West.**
              - **YES**
                - **Contact Tech West.**

---

**NOTE:**

- Voltage should be + or - 10% of rating. Also, make sure pump is jumpered properly.

---

**TRANSFORMER LEADS**

**STEPS TO CHANGE VOLTAGE FROM 230 TO 115 V**

- Move red wire from terminal #8 to terminal #7 and the white/black from terminal #8 to #9.
- Then move orange from #4 to #3.
- Then move black from #6 to #4.

**STEPS TO CHANGE VOLTAGE FROM 115 TO 230 V**

- Move red wire from terminal #7 to terminal #8 and white/black from terminal #9 to terminal #8.
- Then move black from #6 to #4.
- Then move the orange from #3 to #4.

---

**Install Tech West transformer.**

- **NO**
  - **Check for broken or loose power line or excessive voltage drop across line.**
  - **YES**
    - **Is there proper voltage at input terminals?**
    - **YES**
      - **Does relay chatter?**
      - **YES**
        - **Replace remote switching or replace faulty wiring.**
      - **NO**
        - **Defective fuse or transformer or faulty connection within electrical box.**
      - **NO**
        - **Replace relay.**
        - **NO**
          - **Do relay contacts close?**
          - **YES**
            - **Contact Tech West.**

---

**NOTE:**

- Make sure remote switching is bypassed.

---

**Voltage should be + or - 10% of rating. Also, make sure pump is jumpered properly.**

---

**DOES VACUUM PUMP RUN?**

**YES**

**NO**

---

**GO TO THE PREVIOUS PAGE.**
DOES VACUUM PUMP RUN?

YES

Is there sufficient suction?

YES

Is there excessive vacuum?

NO

Does pump run continuously?

NO

NO

Is vacuum relief valve filter or intake strainer screen clogged or is swing check valve sticking?

Clean or replace filter.

NO

Clean or replace filter.

Are there any vacuum leaks at the pump?

YES

Is the office vacuum piping system faulty?

Adjust to 10" hg.

NO

Adjust to 10" hg.

Is the vacuum relief valve set too low? (Normal level is 10" hg)

Contact Tech West.

NO

Is there adequate water supply or water pressure?

YES

CHECK FOR:
1. Correctly sized or defective breaker.
2. Check for proper wire gauge size.

CHECK FOR:
1. Incorrectly sized or defective breaker.
2. Check for proper wire gauge size.

CHECK FOR:
1. Proper sealing of strainer bowl. (D) O-ring may be pinched.
2. Proper functioning vacuum relief valve. (A) Valve may be sticking open.

Contact Tech West.

CHECK FOR:
1. ‘OPEN’ water supply valve.
2. Clogged recyling line
3. Clogged strainer
4. Clogged water regulator
5. Clogged recycler line
6. Check for proper voltage at water solenoid coil (i) (115 V MAX on 1 & 1-1/2 hp, 2 hp). Replace solenoid valve if proper voltage exists.

NO

Is vacuum relief valve filter or intake strainer screen clogged or is swing check valve sticking?

YES

Clean or replace filter.

NO

Clean or replace filter.

Are there any vacuum leaks at the pump?

YES

Is the office vacuum piping system faulty?

Adjust to 10" hg.

NO

Adjust to 10" hg.

Is the vacuum relief valve set too high (above 10" hg)?

YES

Check for adequate ventilation and proper voltage.

NO

Does thermal protector shut the pump down?

NO

Is circuit breaker tripping?

YES

Contact Tech West.

NO

Is vacuum relief valve set too low? (Normal level is 10" hg)

Contact Tech West.

NO

Is there adequate water supply or water pressure?

YES

CHECK FOR:
1. ‘OPEN’ water supply valve.
2. Clogged recyling line
3. Clogged strainer
4. Clogged water regulator
5. Clogged recycler line
6. Check for proper voltage at water solenoid coil (i) (115 V MAX on 1 & 1-1/2 hp, 2 hp). Replace solenoid valve if proper voltage exists.

NO

Is vacuum relief valve filter or intake strainer screen clogged or is swing check valve sticking?

YES

Clean or replace filter.

NO

Clean or replace filter.

Are there any vacuum leaks at the pump?

YES

Is the office vacuum piping system faulty?

Adjust to 10" hg.

NO

Adjust to 10" hg.

Is the vacuum relief valve set too low? (Normal level is 10" hg)

Contact Tech West.

NO

Is there adequate water supply or water pressure?

YES

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6. Check for proper voltage at water solenoid coil (i) (115 V MAX on 1 & 1-1/2 hp, 2 hp). Replace solenoid valve if proper voltage exists.

NO

Is vacuum relief valve filter or intake strainer screen clogged or is swing check valve sticking?

YES

Clean or replace filter.
24 VOLT

REMOTE SWITCH

230 V

20 AMP LISTED CIRCUIT BREAKER REQUIRED

DOES VACUUM PUMP RUN?

YES

NOTES

Voltage should be + or - 10% of rating. Also, make sure pump is jumpered properly.

NON

20 AMP LISTED CIRCUIT BREAKER REQUIRED

GO TO THE PREVIOUS PAGE.

Install Tech West transformer.

NO

Is there sufficient voltage at disconnect box?

YES

Is there proper voltage at input terminals?

YES

Does relay chatter?

NO

Does relay contacts close?

NO

Replace relay.

YES

Contact Tech West.

Low voltage or improperly jumpered pump.

DOES VACUUM PUMP RUN?

NO

Check for broken or loose power line or excessive voltage drop across line.

NO

Does pump run with remote switching bypassed (red & blue low voltage wires connected)?

YES

Replace remote switch or replace faulty wiring.

NO

Is there sufficient voltage (20 – 28 VAC) between the blue and red low voltage wiring?

YES

Defective fuse or transformer or faulty connection within electrical box.

NO

Is there sufficient voltage (20 – 28 VAC) between the blue and red low voltage wiring?

NOTES

Make sure remote switching is bypassed.

NO

CONTACT TECH WEST.
Troubleshooting Chart
Triple Vacuum

1. **Does Vacuum Pump Run?**
   - **Yes**: Is there sufficient suction?
     - **Yes**: Is there excessive vacuum?
       - **No**: Does pump run continuously?
     - **No**: Repair vacuum leaks.
   - **No**: Clean or replace filter.

2. **Repair Vacuum Inlet Line from Pump.**
   - **Yes**: Are there any vacuum leaks at the pump?
     - **Yes**: Is the office vacuum piping system faulty?
       - **Yes**: Contact Tech West.
       - **No**: Adjust to 10” hg.
         - **Yes**: Is the vacuum relief valve set too low? (normal level is 10” hg)
           - **No**: Check usage charts for maximum number of simultaneous users. Upgrade if necessary.
           - **Yes**: Check water supply or pressure.
             - **No**: Check for proper voltage at water solenoid coil (i) (115 V MAX on 1 & 1-1/2 hp, 2 hp). Replace solenoid valve if proper voltage exists.
             - **Yes**: Contact Tech West.
         - **No**: Is vacuum relief valve clogged?
           - **Yes**: Clean or replace filter.
           - **No**: Check for proper voltage.
             - **Yes**: Contact Tech West.
             - **No**: Check for adequate ventilation and proper voltage.
               - **Yes**: Does thermal protector shut the pump down?
                 - **No**: Is vacuum relief valve set too high (above 10” hg)?
                   - **Yes**: Adjust to 10” hg.
                   - **No**: Check for proper wire gauge size.
                     - **Yes**: Is circuit breaker tripping?
                       - **Yes**: Contact Tech West.
                       - **No**: Do relay contacts remain closed?
                         - **Yes**: Contact Tech West.
                         - **No**: Check relay and transformer.

3. **Check for:**
   - Proper sealing of strainer bowl. (D) O-ring may be pinched.
   - Proper functioning vacuum relief valve. (A) Valve may be sticking open.

4. **CHECK FOR:**
   - Properly sized or defective breaker.
   - Check for proper wire gauge size.
DOES VACUUM PUMP RUN?

NO

Is there sufficient voltage at disconnect box?

NOTE: Voltage should be + or - 10% of rating. Also, make sure pump is jumpered properly.

YES

Check for broken or loose power line or excessive voltage drop across line.

NO

Is there proper voltage at input terminals?

YES

Low voltage or improperly jumpered pump.

NO

Does relay chatter?

YES

Replace remote switch or replace faulty wiring.

NO

Does pump run with remote switching bypassed (red & blue low voltage wires connected)?

YES

Defective fuse or transformer or faulty connection within electrical box.

NO

Is there sufficient voltage (20 - 28 VAC) between the blue and red low voltage wiring?

NOTE: Make sure remote switching is bypassed.

YES

Replace relay.

NO

Do relay contacts close?

YES

Contact Tech West.

NOTE:

Voltage should be + or - 10% of rating. Also, make sure pump is jumpered properly.

Go to the previous page.
FIGURE 1. HOW TO SIZE A VACUUM AND AIR SYSTEM

Both the drawing and the size chart are sized to accommodate an air and vacuum system for 100% use. This is done to produce good air and vacuum pressures and flows at all times, from all operatories. You always use this design for a proper system in the event all six operatories are used simultaneously; you would not have any suction loss due to improperly sized main or branch lines.

**Important:** Do not figure or draw any nitrous or sink evacuation terminations until you have a complete system showing termination to high volume evacuation connections normally found in dental unit junction box.

Additional 3/4" vacuum lines for nitrous oxide scavenging and evacuator sinks can be added without affecting main or branch line sizes. See Fig. 8. Except in an overhead system see Fig. 5.

**Step 1:** Count the total number of operatories to be plumbed and select the vacuum line size for either PVC or copper pipe. See the line sizing chart in FIGURE 2.

**Step 2:** This pipe size you have selected will be the starting line or main line and begins at the equipment location. The vacuum line will use a main line riser assembly as shown in FIGURES 1 and 3.

**Step 3:** After figuring your main line size, you may select the best location to split your piping lines to best accommodate the operatories. In FIGURE 3 we have selected to split the system into two zones; "A" and "B". Each zone becomes its own system for purposes on sizing the lines properly. If operatories are in a straight line, zone splitting will not be required; see note Fig. 2.

**Step 4:** Starting from zone split location, count remaining operatories and look at the sizing chart in FIGURE 2. Select correct branch line diameters. In FIGURE 3, zone "B" has 3 operatories remaining which corresponds with 1" vacuum line and 1/2" air line in FIGURE 2 line sizing chart. This sizing logic will continue to the last inlet on all zones.

### FIG. 2. VACUUM AND AIR LINE SIZING CHART

**One to Twelve Operatories for Overhead System See FIG. 5.**

<table>
<thead>
<tr>
<th>Number of Operatories</th>
<th>PVC sch 40</th>
<th>Copper Type &quot;M&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3/4&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>2</td>
<td>1&quot;</td>
<td>1&quot;</td>
</tr>
<tr>
<td>3</td>
<td>1&quot;</td>
<td>1&quot;</td>
</tr>
<tr>
<td>4</td>
<td>1 1/4&quot; - FIG. 3 (10)</td>
<td>1 1/4&quot;</td>
</tr>
<tr>
<td>5</td>
<td>1 1/4&quot; - FIG. 3 (10)</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>6</td>
<td>1 1/4&quot; - FIG. 3 (10)</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>7</td>
<td>1 1/2&quot;</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>8</td>
<td>1 1/2&quot;</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>9</td>
<td>1 1/2&quot;</td>
<td>2&quot;</td>
</tr>
<tr>
<td>10</td>
<td>2&quot;</td>
<td>2&quot;</td>
</tr>
<tr>
<td>11</td>
<td>2&quot;</td>
<td>2&quot;</td>
</tr>
<tr>
<td>12</td>
<td>2&quot;</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>
The tee will always match main line size. Use reducer bushings to match branch (operatory) line. Line sizes will decrease with number of operatories as shown on chart in Fig. 2.

**Fig. 4** Branch line or operatory tee
Example shown is zone split tee

**Important:** All fittings and piping from this bushing to junction box termination must be \( \frac{1}{2} \)".

A trap must be formed here to allow water to collect. Always close couple fittings at trap location.

When installing overhead piping system use these branch line take off examples: you must not deviate from these examples on overhead systems. See Fig. 2 for correct main or branch line size on your system.

**Fig. 5** Overhead system

Connect operatory solids collector here via flexible hook-up hose.

Note: For information on correct termination size at junction box see Fig. 3 note 2.

**Fig. 6** Typical branch line take off
1. HANGER SUPPORTS REQUIRED EVERY EIGHT FEET OR TO SUPPORT PIPING WITHOUT SAGS.

2. ALWAYS STUD VACUUM AND AIR LINE INTO WALL OR FLOOR JUNCTION BOX PER MANUFACTURER’S TEMPLATE. IF 1/2” IS REQUIRED, YOU MAY REDUCE PIPE SIZE AS CLOSE AS POSSIBLE TO TERMINATION POINT. IF A LARGER SIZE IS REQUIRED, THIS CHANGE MUST BE MADE WITHIN JUNCTION BOX.

3. ALL VACUUM PIPING ILLUSTRATIONS AND DRAWINGS ARE SHOWN WITH PVC PIPE SCH 40 AND DWV TYPE FITTINGS. ALWAYS USE SWV FITTINGS. NOT AVAILABLE BELOW 1 1/4”.

4. ALL VACUUM PIPING SHOULD GRADE TOWARD EQUIPMENT LOCATION 1/4” IN TEN FEET.

5. WHEN INSTALLING AN OVERHEAD SYSTEM, USE THE NEXT LARGER VACUUM PUMP MODEL FOR BEST RESULTS.

6. IF OVERHEAD SUCTION LINE TERMINATES IN A FLOOR JUNCTION BOX, USE THIS EXAMPLE. TRAP MUST BE INSTALLED BEFORE LINE RISES AS SHOWN. SEE FIG. 5/A.

7. INSTALL TRAP IN MAIN LINE JUST BEFORE HOOKING THE FLEXIBLE INTAKE HOSE CONNECTION TO PUMPS. SEE FIG. 1, EXAMPLE B.

8. IN AN OVERHEAD SYSTEM, THE MAIN VACUUM LINE WILL DROP DOWN TO THE SWIRL-VAC LOCATION USING REQUIRED PIPE SIZE. ALL OVERHEAD SYSTEMS ARE SIZED IN THE SAME MANNER AS THE SYSTEM SHOWN HERE.

9. DO NOT RUN POLY FLO TUBING BELOW SLAB. ALWAYS RUN PIPE ABOVE SLAB, THEN MAKE POLY FLO CONNECTION.

10. FIG. 2 LINE SIZING CHART SHOWS MAIN VACUUM LINE SIZE DIAMETER FOR 4, 5 AND 6 OPERATORIES AS 1 1/4” DIAMETER. IF 1 1/4” DIAMETER IS NOT AVAILABLE, YOU MAY USE 1 1/2” DIAMETER.

11. RISER ASSEMBLY MUST ALWAYS BE USED. SEE FIG. 1 EXAMPLE A FOR RISER ASSEMBLY SPECIFICATIONS.

12. CONTROL PANEL SUPPLY LINES SHOULD BE CONNECTED CLOSE TO EQUIPMENT ROOM AND MUST ALWAYS CONNECT VERTICALLY TO MAIN LINE AS SHOWN.

13. ALTERNATE CLEAN AIR INTAKE SOURCE SHOULD BE EITHER PVC OR COPPER PIPE, CONNECTED TO HVC. RETURN AIR DUCT. SEE AIR COMPRESSOR DIAGRAM FIG. 4.