VP531A & C Pneumatic Terminal Unit Valve

GENERAL

Description

The VP531A & C Pneumatic Terminal Unit Valves are single-seated, normally open valves with a straight through body pattern and an integral pneumatic operator. Valves are available with either threaded NPT or soldered piping connections. The VP531A rating is 180F (82C) maximum and the VP531C is rated at 240F (116C) maximum.

Application

The VP531A & C, used with a direct acting room or unit thermostat, provide proportional control of hot water in fan coil units, finned-tube radiation, or small reheat coils. The VP531C is used for steam systems. The valves can also be used on chilled water coils (however the VP531A is recommended) if controlled by a reverse acting thermostat. Models are available with spring ranges for sequence operation.

Operation

An increase in control air pressure causes the valve to move toward the closed position, modulating the flow of the steam or water supply (Fig. 1). The valve is fully open when the control air pressure is at or under the low end of the operating range and is fully closed when the control air pressure is at the high end.

Specifications

Construction:

Body: Cast bronze
Disc and plug:
VP531A: High-temperature rubber
VP531C: Brass disc holder and removable teflon disc
Seat: Bronze; integral with body
Stem: Stainless steel, 3/16-in. (5-mm) diameter
Bonnet nut seal: Reusable copper ring
Packing:
VP531A: Rubber, spring loaded, self adjusting
VP531C: Teflon, spring loaded, self adjusting

Flow Characteristics:
Modified equal percentage

Body Pressure Rating (Nominal):
150 psi (1034 kPa)

Controlled Medium Temperature:
240F (116C) maximum
140F (60C) maximum allowable difference for alternating hot and cold water

Fig. 1. Typical Valve Operation.
Maximum Pressure Differential for Quiet Service and Normal Life of Disc and Seat:
Water: 20 psi (138 kPa)
Steam: 10 psi (69 kPa)

Actuator:
Rolling diaphragm type

Air Connection:
Integral, for 1/4-in. (6-mm) O.D. plastic tubing

Maximum Safe Air Pressure:
30 psi (207 kPa)

Maximum Safe Diaphragm Temperature:
230°F (110°C)

Accessories:
14001101-001 Position Indicator
14003648-001 Vandalism Resistant Assembly (cover assembly with 1/8-in. NPT air connection and push-in retainer to replace standard cover)

![Fig. 2. VP531A & C close-off ratings at various control air pressures.](image)

**WARNING**

Use solvents in a well ventilated area. Avoid prolonged inhalation of solvents and/or contact with the skin. Careless handling of solvents can cause permanent injury to the respiratory system and skin tissue.

**Operational Check**

Determine proper operation as follows:

**Heating Application**

1. Adjust the thermostat setpoint above the present space temperature. The valve should open and the coil discharge temperature should rise.
2. Adjust the thermostat setpoint below the present space temperature. The valve should close and the coil discharge temperature should drop.

**Cooling Application**

1. Adjust the thermostat setpoint above the present space temperature. The valve should open and the coil discharge temperature should rise.
2. Adjust the thermostat setpoint below the present space temperature. The coil valve should open and the discharge temperature should drop.

**MAINTENANCE**

**Inspection and Cleaning**

1. Inspect the valve for leaks around the packing. If repacking is necessary, see PACKING REPLACEMENT.
2. Check for secure pneumatic lines and connection to the valve.
3. Use commercial cleaning solvent to remove all dirt and grease accumulation from around the valve assembly. Recommended cleaning solvent is Chlorothene or Vythene typewriter cleaners (containing trichloroethane, inhibited 1-1-1), available at most office supply stores.
TROUBLESHOOTING

Equipment Required

The following are available from Honeywell:

— 14003519-001 Add-a-Gage Kit, 0 to 30 psi (0 to 207 kPa)
— MQP852 (CCT852) Pressure Bulb

Procedures

Sticking Stem or Leakage Around Stem

If there is evidence of a sticking stem or any signs of leakage around the stem observed during valve operation, disassemble, clean, and repack the valve. Also replace the stem and disc holder assembly if it is worn. See Figure 3 for parts.

No Waterflow Through Valve

1. Check thermostat for proper operation. Measure branchline pressure for changes with a pressure gage as the thermostat setpoint is adjusted. If the pressure does not change in relation to the adjustment made, refer to the specific thermostat service data sheet.

2. Check the supply system to the valve.
   a. Water Systems:
      — Are supply pumps running? Turn on if required.
      — Is the piping air locked? Bleed if required.
   b. Steam systems:
      — Is supply pressure adequate? Check that the supply pressure is correct.
      — Is steam trap functioning correctly? Service or replace if faulty.

Uncontrolled Water Flow Through Valve

1. Set the thermostat setpoint alternately to settings above and below the ambient temperature. If the branch pressure does not change as the thermostat setpoint is adjusted, disconnect tubing at top of actuator and check for a leaking diaphragm as follows:
   a. Attach a gage and pressure bulb to the actuator.
   b. Attempt to pump the actuator up to 13 psi (90 kPa). If pressure cannot be maintained, a leaking diaphragm is indicated and the complete top assembly must be replaced.
   c. If the actuator is able to maintain the 13 psi (90 kPa) pressure, but pressure drops when the tubing is reconnected, look for an air leak at the valve fitting, the control air tubing, or the thermostat. Repair leak if required.

2. If everything appears normal at the valve location, but the valve stem remains open:
   a. Check the water supply and return pressures to determine if the differences exceed the close-off rating of the valve. In the case of steam, the supply pressure cannot exceed the close-off rating. Adjust system pressure if required.
   b. If the supply and return pressures are within the limits but a constant flow persists, check for a defective valve seat or plug, or the possibility of a foreign object in the valve, preventing the plug from seating. The valve must then be disassembled. If the valve seat is found defective, replace the complete valve assembly. Valve disassembly or replacement requires shutting down the system.

REPAIR

Equipment Required

Thin, open-end wrench (MQG638 1-1/4 in. Wrench for solder body valves).
Commercial cleaning solvent.

WARNING

Use solvents in a well ventilated area. Avoid prolonged inhalation of solvents and/or contact with the skin. Careless handling of solvents can cause permanent injury to the respiratory system and skin tissue.

Packing Replacement

1. Remove system air and water pressure. Disconnect tubing from barb connector on top of actuator.

2. Unscrew valve bonnet nut from valve body (Fig. 3) using a flat, open-end wrench and remove the entire top and insert assembly.

3. Remove the retainer from the side of the cover, twist top counterclockwise and lift off.

4. Remove spring retaining cup and main spring by sliding cup to disengage stem from captive slot.

5. Unscrew bonnet nut from bonnet. Remove stem and disc holder assembly. Use stem to push out the packing spring, old packing, and packing spacers upwards from the bonnet.

6. Inspect stem for scoring or bent condition. Check plug and disc holder and valve seat. Replace stem and disc holder assembly if damaged. If the seat is defective, replace the complete valve.

7. Thoroughly clean bonnet and valve stem with recommended cleaning solvent (see INSPECTION AND CLEANING).

8. Reassemble all parts using fresh lubricant and new packing (see PARTS LIST).

9. Restore air and water pressure to system and perform operational check (see OPERATIONAL CHECK).
Top Assembly Replacement

1. Remove air pressure to actuator and disconnect tubing.
2. Remove cover and rotate top assembly counterclockwise to disengage it from the base. Lift top assembly off.
3. Install replacement unit.
4. Reconnect tubing to actuator and restore system air supply.

Diaphragm Replacement

Repair defective diaphragm by replacing the complete top assembly (see TOP ASSEMBLY REPLACEMENT).

Stem and Disc Holder Replacement

Use the same procedure as in PACKING REPLACEMENT.

Top and Insert Assemblies

(Available for VP531C)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1004</td>
<td>1.6</td>
<td>14004898-001</td>
<td>14002560-010</td>
</tr>
<tr>
<td>1012</td>
<td>1.6</td>
<td>-001</td>
<td>-010</td>
</tr>
<tr>
<td>1020</td>
<td>2.3</td>
<td>(not available)</td>
<td>(not available)</td>
</tr>
<tr>
<td>1038</td>
<td>2.3</td>
<td>(not available)</td>
<td>(not available)</td>
</tr>
<tr>
<td>1046</td>
<td>2.6</td>
<td>-002</td>
<td>-011</td>
</tr>
<tr>
<td>1053</td>
<td>2.6</td>
<td>-002</td>
<td>-001</td>
</tr>
<tr>
<td>1061</td>
<td>3.3</td>
<td>-003</td>
<td>-012</td>
</tr>
<tr>
<td>1079</td>
<td>3.3</td>
<td>-003</td>
<td>-012</td>
</tr>
<tr>
<td>1087</td>
<td>1.6</td>
<td>-001</td>
<td>-010</td>
</tr>
<tr>
<td>1095</td>
<td>1.6</td>
<td>-001</td>
<td>-010</td>
</tr>
<tr>
<td>1103</td>
<td>2.6</td>
<td>-002</td>
<td>-011</td>
</tr>
<tr>
<td>1111</td>
<td>2.6</td>
<td>-002</td>
<td>-011</td>
</tr>
<tr>
<td>1129</td>
<td>3.3</td>
<td>-003</td>
<td>-012</td>
</tr>
<tr>
<td>1137</td>
<td>3.3</td>
<td>-003</td>
<td>-012</td>
</tr>
</tbody>
</table>

VP531A High Temperature Conversion

Rebuilding of a VP531A for higher temperature service is possible using either a Replacement Top and Insert Assembly or using a Stem and Disc Holder Assembly (See Table 1). If rebuilding is done using a Stem and Disc Holder Assembly, it is recommended that the valve actuator cover be marked accordingly and that the valve be repacked with Teflon packing (Kit No. 14003297-002).
PARTS AND ACCESSORIES

Parts List

Available parts and repair assemblies for the VP531A & C Valve are shown on Figure 3. Valve bodies are not available separately.

Fig. 3. VP531A & C top and insert assembly exploded view.

NOTES:

⚠️ REPLACEMENT BONNET AND PACKING ASSEMBLY 14003373-001 VP531A.
⚠️ SERVICELINE REPACK KIT 14003297-001 (INCLUDES LUBRICANT) FOR VP531A.
⚠️ SERVICELINE REPACK KIT 14003297-002 (INCLUDES LUBRICANT) FOR VP531C.
⚠️ O-RING NO LONGER NEEDED AS IT IS NOW MOLDED INTO PLUG (VP531A).
Accessories

Accessories for the VP531A Valve are shown in Figures 4 and 5. The position indicator (Fig. 4) mounts between the diaphragm and spring retaining cup (Fig. 3). The vandalism shield (Fig. 5) replaces the cover furnished with the valve.

Fig. 4. 14001101-001 position indicator.

Fig. 5. 14003648-001 vandalism shield