



1. The manuals include bottom center located page numbers; Index as included for each unit as attached.
2. Vacuum System Literature Additions
 1. AVC150D, Model Number Installed
 2. Safety Precautions;
Never attempt maintenance of this vacuum system while power is applied to the system from the disconnect panel. Verify the panel is in the off position prior to attempting any maintenance.
 3. Emergency Operations;
In the event of equipment failure or abnormal operation, disconnect power from unit at electrical disconnect box. Turn off the fresh water supply line to the separator system.
 4. Environmental Conditions;
The vacuum system should be installed in a clean, dry equipment room, on a stable, level surface. The ambient air temperature in the room should be between 40 degrees Fahrenheit (4 C) minimum to 100 degrees Fahrenheit (38 C) maximum. Temperatures outside of this range will detrimentally effect the overall operation and continued reliability of the system.
 5. Lubrication Data;
No lubrication is required for the vacuum system during its normal operating life.
 6. Removal and Replacement Instructions;
For entire system Removal, the reverse of the installation instructions on page 8 of the manual is used. For major system components, removal instructions are as follows;
Vacuum Producer –
 1. Disconnect power at electrical disconnect box.
 2. Remove power line conduit at blower motor.
 3. Disconnect intake and exhaust lines plumbed into blower housing.
 4. Unbolt blower head assembly from mounting platform, 4 places.
 7. Replacement Parts List included in manual, Page 14.
 8. Corrective maintenance man-hours;
 1. Complete System Installation – 4 hours
 2. Blower Head Replacement – 1 hour
 3. Separator Replacement – 1 hour
 4. Solids Collector Replacement – 0.5 hour
 5. Vacuum Relief Valve Replacement/Adjustment – 0.25 hour
 6. Electrical Repair, Control Box – 1 hour
 7. Electrical Repair, Separator System – 1 hour
 8. Separator Drain Pump Impeller Replacement – 0.5 hour
 9. Identification of Parts;
Parts of the vacuum system are identified on Pages 1, 8, 9, 10, and 11 of the Installation and Operation Manual.
 10. Personal Training Requirements;
Only a qualified technician familiar with electrical and mechanical systems should perform maintenance on the vacuum system. Identification and replacement of major system components should only be done by qualified personnel. Regular maintenance and cleaning can be done by anyone after carefully reading the installation and operation manuals for this equipment, and following the instructions as outlined.
 11. Test Equipment and Special Tool Information;
Tools required for major component replacement are; a standard inch end wrench and ½" socket set, ¼" – 1 1/8", with 8" extension, a true RMS voltmeter and ammeter, a plastic fuse puller, a six inch pipe wrench, an 8" adjustable end wrench, and a medium standard and phillips screwdriver.
 12. Local Representative and Service Facility;
Virge Hoadley, Apollo Manufacturer Representative, ph (805)306-0618 fax (805)306-0619

APOLLO DENTAL PRODUCTS, INC.

245 West Dakota Avenue • Clovis, California 93612

Phone: 800/233-4151 (US & Canada) • 559/292-1444 (International Customers) • Fax: 559/292-1555 • www.apollodental.com



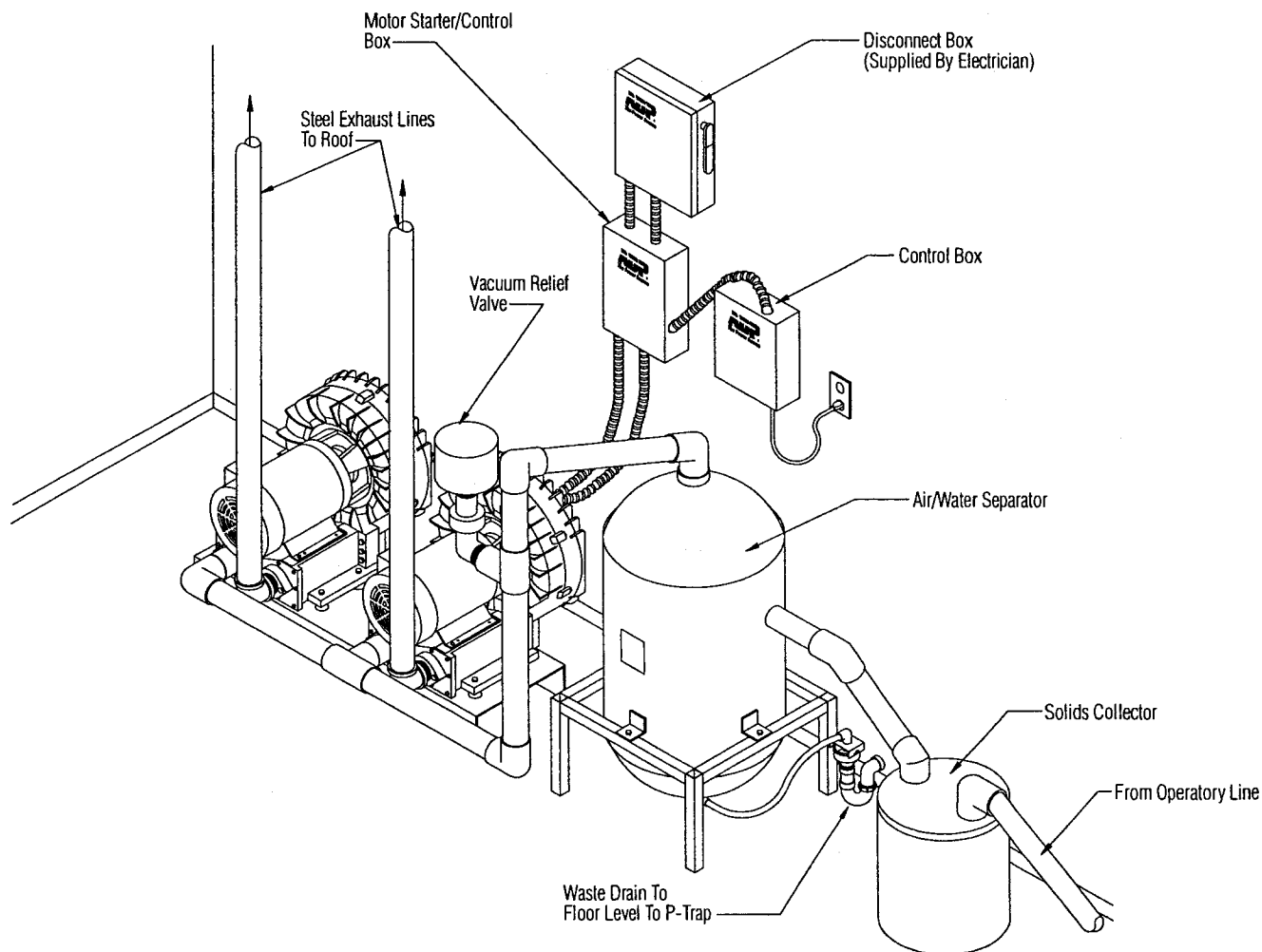
Installation Instructions Centrifugal Vacuum Systems

Index for Installation and Operations Manual

Page	Subject
1	Unpacking the System
2	System Specs and Installation Requirements
3	Simplex Unit Electrical Diagram, General
4	Simplex Unit Electrical Diagram, Control Box
5	Duplex Unit Electrical Diagram, General
6	Simplex Unit Electrical Diagram, Control Box
7	Vacuum Piping Guidelines
8	Vacuum System Installation Instructions
9	Initial Start-Up Instructions
10	Vacuum System Operating Description
11	Vacuum System Operating Description (cont'd)
12	Periodic Maintenance Instructions
13	Vacuum System Troubleshooting
14	Replacement Parts List & Warranty Information

Installation & Operation

Centrifugal Vacuum System



Description:

This Apollo Dental Product vacuum system should only be installed by qualified personnel. The instructions outlined in this manual are applicable for all ADP Centrifugal Vacuum Systems. Should any questions arise during installation, call ADP's Technical Support between the hours of 6:00 a.m. to 5:00 p.m. (Pacific Standard Time).

Note: This manual should remain with vacuum system at all times.

Unpacking The System:

1. Remove the plywood shipping frame.
2. Check to be sure that the pump is not damaged.
3. Remove the pump from the shipping platform.
4. Place rubber shock mounts directly under tank feet.

Centrifugal Vacuum System Specifications:

Model	Max. Users	Sound Levels	Width	Depth	Height	Weight
AVC50S	11	78 db-A	90 in.	43 in.	51 in.	280 Lb.
AVC75S	15	80 db-A	90 in.	43 in.	51 in.	310 Lb.
AVC60D	12	81 db-A	108 in.	43 in.	51 in.	325 Lb.
AVC100D	22	82 db-A	108 in.	43 in.	51 in.	685 Lb.
AVC150D	30	84 db-A	108 in.	43 in.	51 in.	735 Lb.

Hook-Up Requirements:

Prior to installation the following connections are required. These should be supplied by licensed plumbing and electrical contractors and **Must Be Installed In Accordance With Local Code.**

Electrical Hook-Up Requirements:

Low Voltage Line

Run (2) 8-3 thermostat wires from remote control switch if low voltage switching is desired.

Line Voltage:

A single phase 115 volt, 60 Hz. and three phase 208-230 volt, 60 Hz. supply circuits with approved ground connections is required. The following electrical data is provided for use in complying with local codes. (460V is available on request).

Model	Voltage	Total Amperage	Phase	Recommended Breaker Size
AVC50S	208-230/460	16 / 8	3	30 / 20
AVC75S	208-230/460	21 / 10.5	3	40 / 20
AVC60D	208-230/460	38 / 19	3	2 @ 30 / 2 @ 20
AVC100D	208-230/460	32 / 16	3	2 @ 30 / 2 @ 20
AVC150D	208-230/460	40 / 20	3	2 @ 40 / 2 @ 30

Plumbing Hook-Up Requirements:

1. Water Line

1/2" cold water line with shut "OFF" valve terminating in 1/2" FPT. Line should be flushed out prior to connection.

Important: Water is essential for the flush operation. The supply must not be restricted or interrupted.

2. Waste Line

1" PVC Floor Sink located within 3' of vacuum systems.

3. Vacuum Line

Terminal vacuum line in a vacuum piping system are given in the following sections. Continuously running sinks or cuspidors should **Never** be connected to the vacuum piping system.

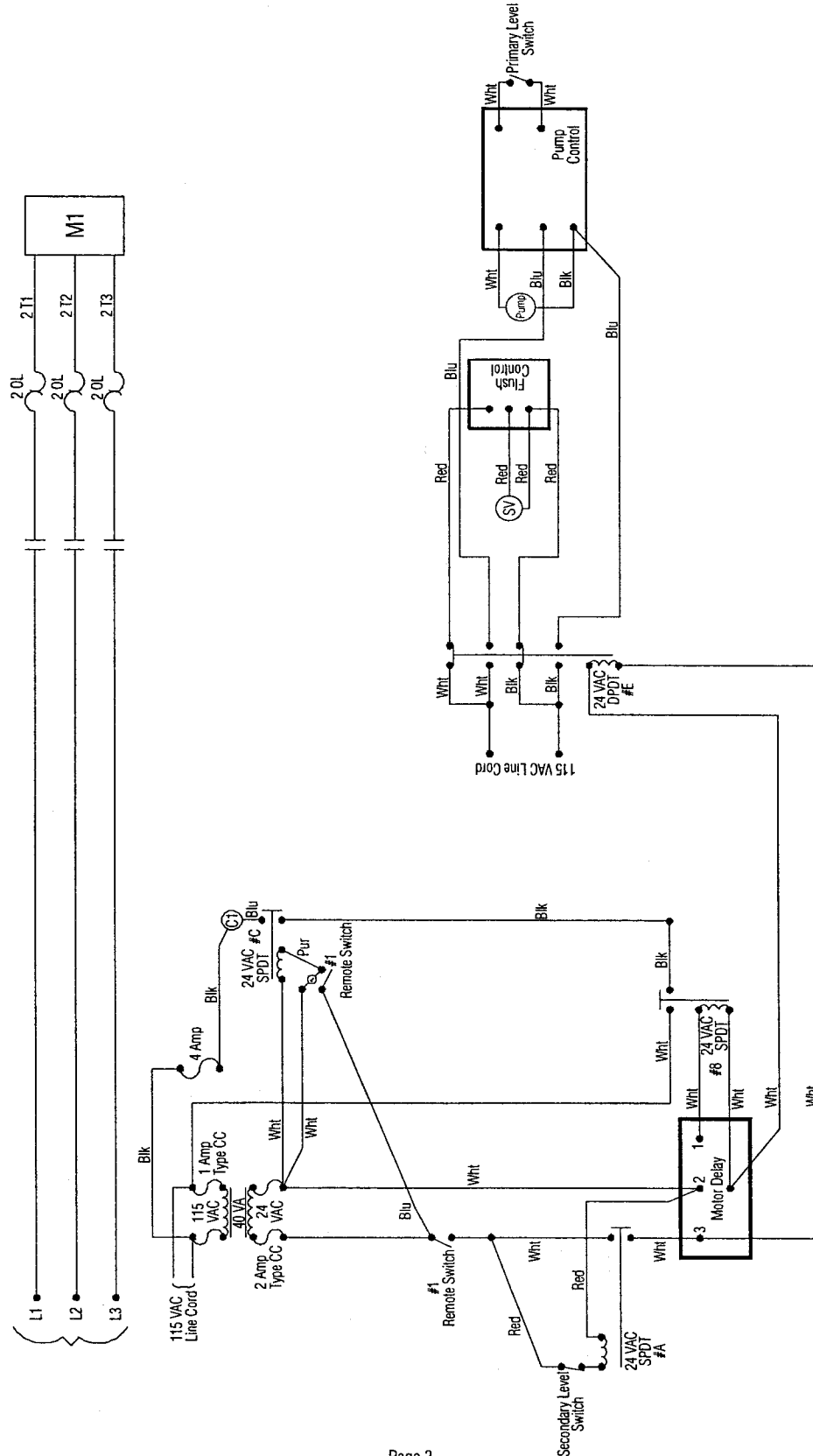
- | | | | |
|----------|------------|-----------|------------|
| • AVC50S | 1 1/2" PVC | • AVC75S | 3" PVC |
| • AVC60D | 2 1/2" PVC | • AVC100D | 2 1/2" PVC |
| | | • AVC150D | 3" PVC |

4. Exhaust Line(s)

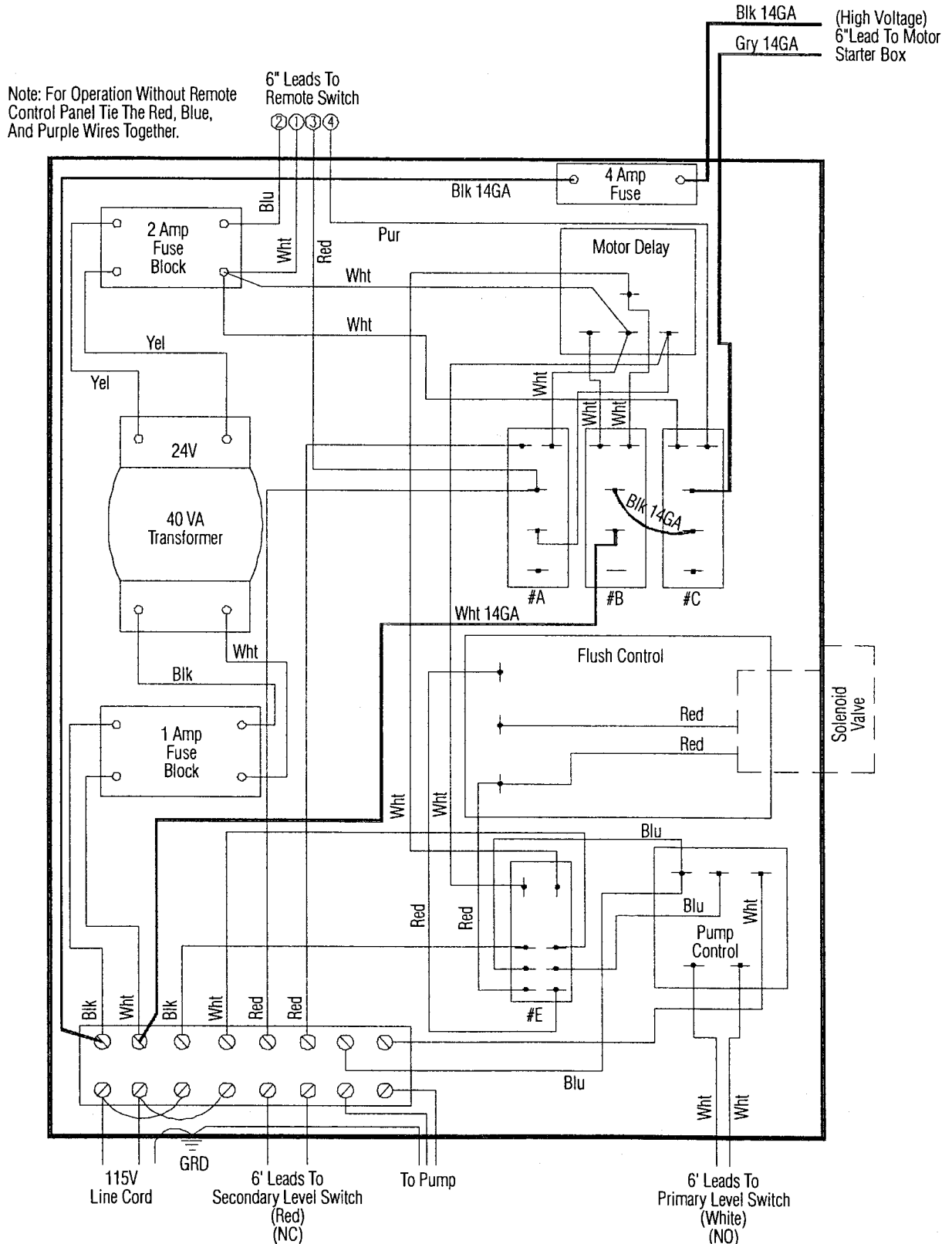
Support Steel Pipe Terminating In.

- | | | | |
|----------|-----------------|---------------|-----------------|
| • AVC50S | 2 1/2" FPT Pipe | • AVC60D (2) | 2" FPT Pipe |
| • AVC75S | 2 1/2" FPT Pipe | • AVC100D (2) | 2 1/2" FPT Pipe |
| | | • AVC150D (2) | 2 1/2" FPT Pipe |

Electrical Hook-Up Requirements (Continued) Single Head Models



Electrical Hook-Up Requirements (Continued) Single Head Models



Vacuum Piping System Guidelines:

The design of the vacuum piping can have a large effect on the efficiency and reliability of a dental vacuum system. Experience has shown that the most effective vacuum piping design are based on the pressure losses sustained in the lines. The losses must be kept to a minimum. It is very important that the line sizing be large enough to accommodate the required flow with very little pressure loss. The Vacuum Line Sizing Chart below is based on the criteria described above.

Vacuum Line Sizing Chart:

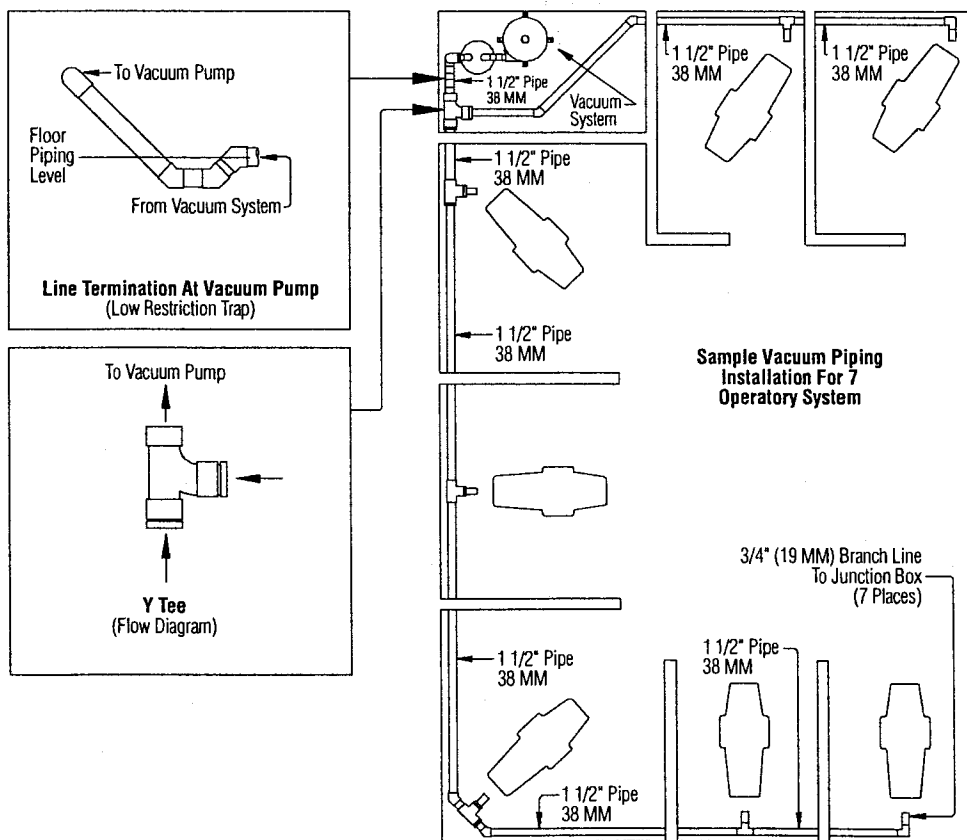
Note: Use the number of operatories being supplied, not the number of outlets within the operatory to determine line size at any given point. Branch lines to individual operatories off the main suction line should be 3/4" diameter.

Number Of Operatories Supplied Through Line	Pipe Diameter In Inches
1 - 8	1 1/2"
9 - 14	2"
15 - 20	2 1/2"
21 - 30	3"

The vacuum lines should be supported to prevent sag and should be sloped 1/4" for every 10' towards the vacuum pump. It is of primary importance to minimize 90 degree turns in the system. These will not only cause vacuum losses, but will also provide areas where sediment can accumulate. A combination of two 45 degree elbows are preferable to a 90 degree elbow. Restrictions in the line will also cause vacuum losses, Y-Tee fittings should be used whenever possible.

A sample Vacuum Piping Diagram is shown below. Consult ADP Technical Support for further information regarding vacuum line sizing.

Vacuum Piping Diagram



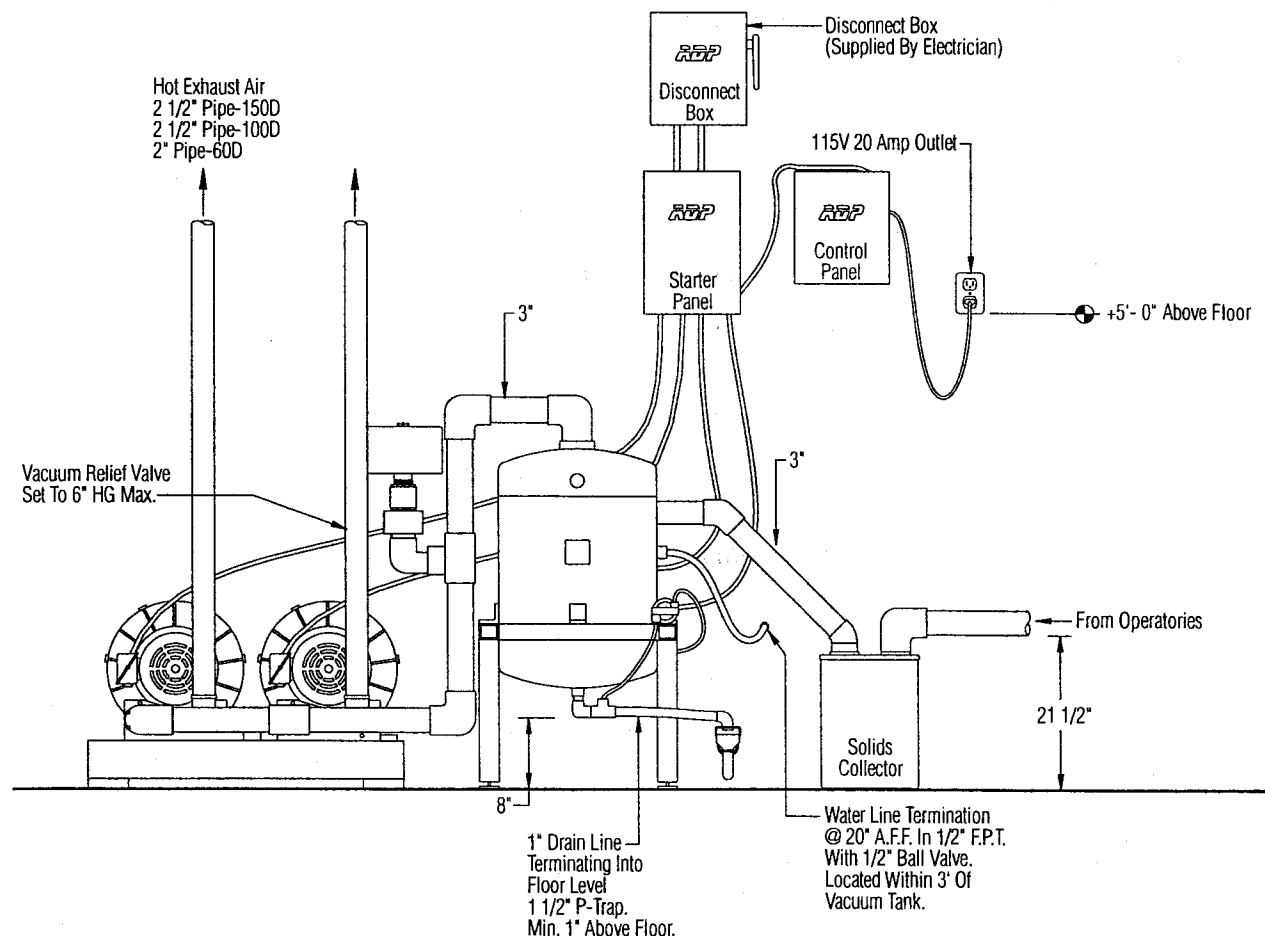
Installing The Vacuum System:

1. Place the vacuum on a solid level floor within 3' of the floor sink.
2. Connect solids collector to separation tank using the provided PVC assembly.
3. Connect vacuum line from operatories to the solids collector using PVC and necessary fittings.
4. Attach, glue and route 1" drain hose assembly.
5. Connect 1/2" water line to solenoid valve using the provided flexible water hose.
6. Connect steel exhaust piping to outlet side of each pump.

Note: Exhaust air may reach +200 degrees Fahrenheit. Exhaust piping must be supported.

7. Connect high voltage electrical supply line to the pump as indicated in the electrical diagram. See Page 3.
8. For low voltage remote control, connect low voltage wires to wires of corresponding number from the ADP Master Control Panel vacuum switch. **See following diagram for sample installation.**

Installation Diagram



Initial Start-Up:

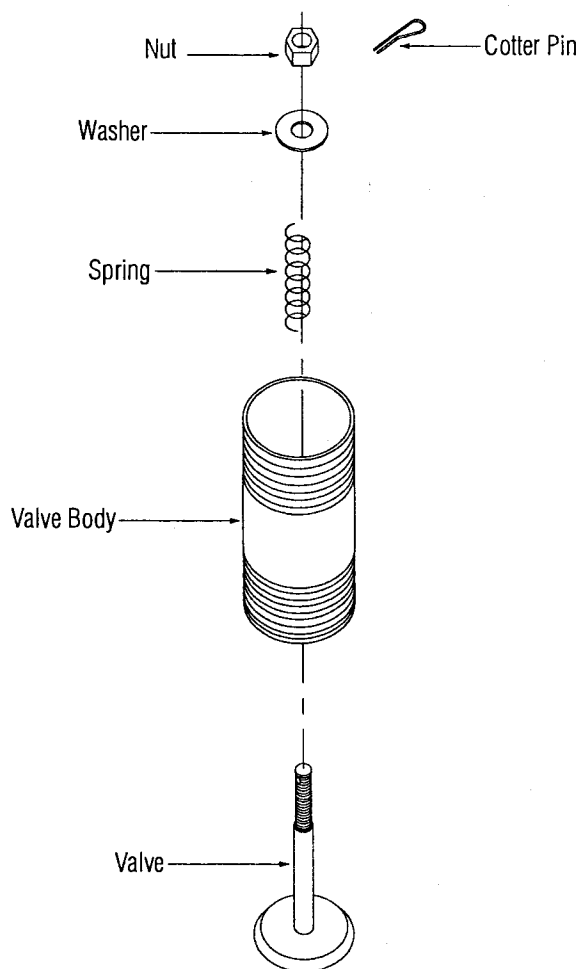
1. Check that the water supply valve is **OPEN**.
2. Start the pump via voltage switch or main circuit breaker.
3. Check vacuum gauge to ensure that the pump is functioning properly. Vacuum relief is factory preset for 6" Hg Vacuum.
4. Check for system leaks.
5. Momentarily turn power "**OFF**" then back "**ON**". The system should then go through a three minute delay before it restarts.

Vacuum Level Adjustment:

The vacuum level is adjustable in the range of 3" to 6" Hg. All of the vacuum relief regulator valves should be set for the same relief operating vacuum level. With vacuum "**ON**" and all evacuators **CLOSED**:

1. Remove cotter pin. **See drawing below.**
2. Turn adjustment nut **clockwise for higher** vacuum level, **counter-clockwise for lower** vacuum level.
3. Replace cotter pin.

Note: Never adjust vacuum level over 6" Hg.



Operation:

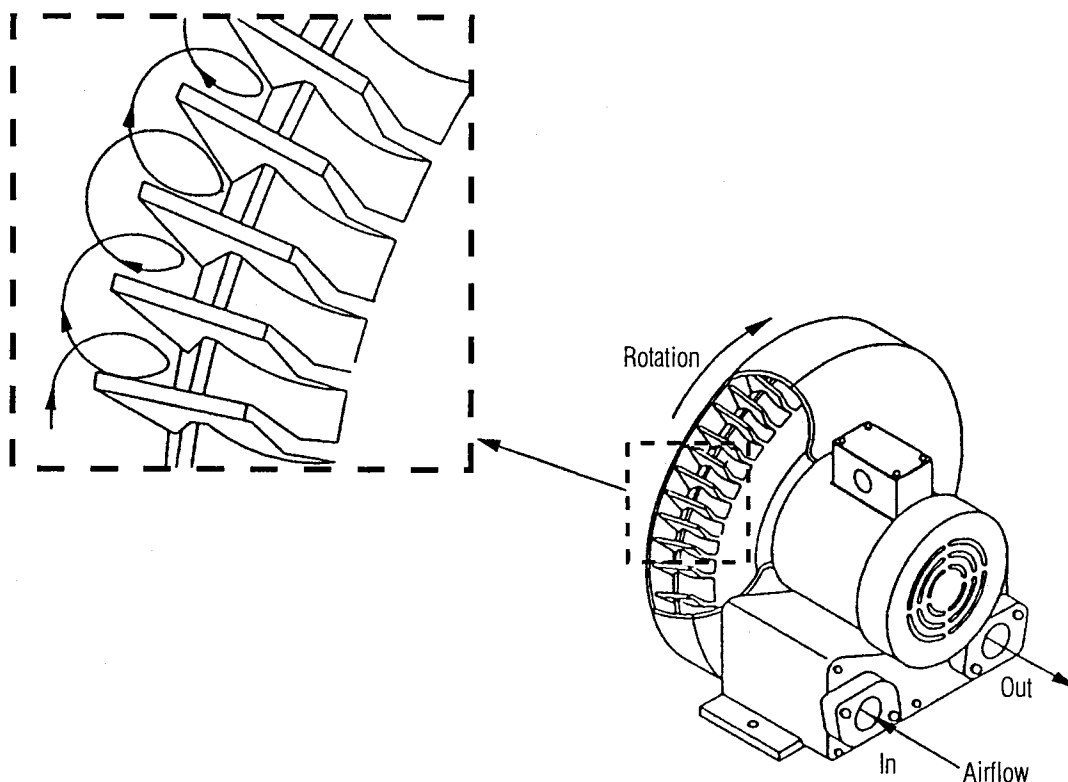
General Description

The ADP Centrifugal Vacuum Pump is a non-positive displacement pump that provides high flow rates, low power consumption and vacuum level up to 6" of mercury.

The pump is designed to run continuously and can therefore be left **"ON"** over the course of the workday.

Principles Of Operation

As the impeller rotates, the blades pass over the inlet port and draw air into the housing. Centrifugal force moves the air from the base of each blade to the tip, the air then impacts the walls of the housing and is reflected back down to the base of the succeeding blade. This process is repeated several times during each revolution of the impeller compressing the air on each cycle, until it reaches the outlet port where the housing diameter is reduced, diverting the air out of the housing.



Automatic Liquid Level Safeguard System

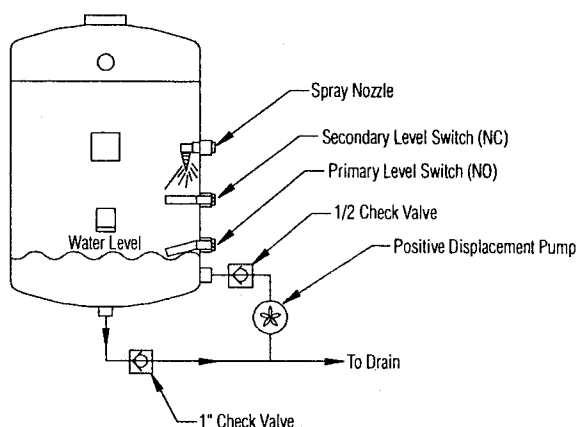
Description

The ADP Centrifugal Vacuum Systems come equipped, as standard, with an Automatic Liquid Safeguard System. The Automatic Liquid Level Safeguard System protects the pump(s) from accidental liquid ingestion without interrupting system operation.

Operation

As the liquid level reaches a set point inside the tank, the primary float switch closes and energizes the positive displacement pump which in turn expels liquid waste. This cycle is repeated only as needed through the course of the workday. If the liquid level should ever exceed the primary level switch boundary, the secondary level switch will be employed to shut the system down for a three minute period, allowing the liquid waste to drain.

Note: The three minute shut-down will also occur if there is momentary loss of power to the system.



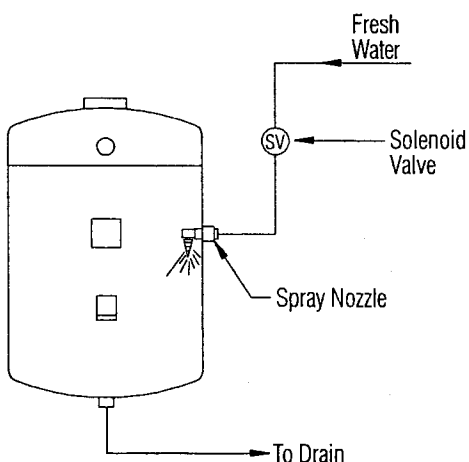
Automatic Tank Flush Cycle

Description

The ADP Centrifugal Vacuum Systems come equipped, as standard, with an Automatic Tank Flush Cycle. The Automatic Tank Flush Cycle rinses the tank every night after shut-down. Water consumption is kept to a minimum with 4.2 gallons/cycle.

Operation

Upon shut-down the swing check valve opens and allows the liquid waste to drain. After a two hour delay, the flush cycle initiates and rinses the tank with a three minute spray of water.



Maintenance:

ADP Centrifugal Vacuum pumps are designed for ease of operation and minimal maintenance. The following periodic maintenance is recommended. If the pump is functioning properly no other maintenance is necessary.

Vacuum Relief Valve (Cleaning):

Periodic cleaning of the vacuum relief valve is required for proper operation.

1. Turn vacuum "OFF".
2. Remove vacuum relief valve muffler/filter.
3. Clean muffler/filter with compressed air.
4. Disassemble vacuum relief valve as demonstrated in the illustration on Page 7.
5. Clean vacuum relief valve thoroughly and reassemble.

Note: Piston must move freely.

6. Install valve and muffler/filter.
7. Start vacuum and adjust relief valve to 6" mercury max.

Emptying Solids Collector Drum:

The solids collector drum should be emptied annually. The disposal of the hazardous waste must follow local codes.

1. Turn vacuum "OFF".
2. Remove PVC piping from inlet and outlet.
3. Loosen lid locks and remove lid.
4. Dispose of waste water per local code.

Vacuum Maintenance Guide Chart:

Maintenance Procedure	Daily	Weekly	Semi-Annually	Annually
Cleanse Vacuum Piping System	• • •			
Clean In-Operatory Strainers		• • •		
Check Vacuum Level		• • •		
Clean and Dust Off Vacuum Pump			• • •	
Empty Solids Collector Drum				• • •

PROBLEM: Motor will not start when turned "ON".

Cause: No power to pump motor.

Remedy:

1. Check for proper voltage at pump start contactor (208 VAC \pm 10%). If proper voltage is not present, check circuit breakers and supply circuit.
2. If low voltage switching is being used, bypass low voltage circuit by connecting the red, blue, yellow and purple wires from the top of the electrical box.

Cause: Defective transformer or fuse.

Remedy:

1. Check the voltage. If it isn't between 20 and 28 VAC the fuse or the transformer is defective, or there is a faulty connection within the box.

Cause: Faulty level switch.

Remedy:

1. Check for continuity between the two leads from the secondary level switch.

Cause: Defective coil.

Remedy:

1. If the voltage of step 3 was within limits, and there is continuity in step 4, replace starter contactor coil.

PROBLEM: Pump runs but creates insufficient "suction".

Cause: Vacuum Solids Collector clogged.

Remedy:

1. Clean, or replace, as indicated in maintenance section.

Cause: Faulty vacuum system.

Remedy:

1. Remove the vacuum inlet line from the pump. If there is good suction at the pump, but none or little in the system, the system is clogged or contains leaks. Locate the problem and repair.

PROBLEM: Pump runs but creates insufficient "suction".

Cause: Inadequately sized pump.

Remedy:

1. Check usage chart for maximum number of simultaneous users. Upgrade if necessary.

Cause: Stuck vacuum relief valve.

Remedy:

1. Clean or replace vacuum relief valve.

PROBLEM: Pump will not run continuously.

Cause: Overheating. Thermal protection shutdown.

Remedy:

1. Check for adequate ventilation. The motor is air cooled and a ventilation fan may be required.

Cause: Circuit breaker tripping.

Remedy:

1. Check for incorrectly sized or defective circuit breaker.

Cause: Faulty relay.

Remedy:

1. Replace relay if contacts fail to remain closed.

Replacement Parts List:

Description	Part Number
Drum - Solids Collector with Lid	TVA90500
Gauge - Vacuum	PGA70415
Impeller - Liquid Discharge Pump Replacement	MMS80472
Motor - 3 HP	HRM10110
Motor - 5 HP	HRM10115
Motor - 7.5 HP	HRM10120
Pump - Liquid Discharge	MMS80470
Solenoid - Panel Mount	PVV10479
Starter Contactor - Under 5 HP	ETR10470
Starter Contactor - 7.5 HP	ETR10472
Switch - Level 1/2"	ECS10461
Timer - Pump Control	EMS80502
Timer - Flush Control	EMS80503
Timer - Motor Delay	EMS80501
Transformer - 230V/24 VAC 100 VA	ETR10502
Valve - 1/2" Check	PVV50656
Valve - 1" Check	PVV50658
Valve - 3" Check	PVV50660
Valve - Relief / Regulator	SVA50558

Warranty Information: 2 Year

All ADP units are thoroughly inspected and tested in accordance with rigid specifications and standards. Our products are guaranteed against any defective material and workmanship from the date of shipment; provided, that the installation, operation, and maintenance is done in accordance with ADP procedures as outlined in our Installation and Maintenance Guides. Warranty cards must be returned to ADP within ten days of installation to effect warranty. No other warranties or guarantees, expressed or implied are made.

ADP's obligation under the warranty is to provide parts for the repair or, at its option, to provide the replacement product (excluding labor). All special, incidental and/or consequential damages are excluded. We will not issue credit for complete air compressors or vacuum systems without first attempting to correct the problem in the field. Written notice of breach of warranty must be given to ADP within the warranty period. The warranty does not cover damage resulting from improper installation or maintenance, accident or misuse. The warranty does not cover damage resulting from the use of cleaning, disinfecting or sterilizing chemicals and processes. The warranty does not cover vacuum failures due to hard water deposits. Failure to follow instructions provided in ADP's Installation and Maintenance Guides may void the warranty.