



# **BULLDOG**

**DENTAL VACUUM SYSTEM**



**OPERATION, MAINTENANCE  
AND USER MANUAL**





Thank you for selecting RAMVAC to serve your dental facility. RAMVAC provides industry leading technology for convenient and efficient utility room equipment.

Invest a few minutes of your time and:

1. Read the "Maintenance" section in this guide. Use these simple preventative procedures that will allow your compressor to reach its service-life potential.
2. Read the "Operation" section in this guide. Find out how to best control you vacuum and put its safety features to work for you.
3. Initiate the warranty. Check inside the back cover to review out warranty commitment to you ... and what you need to do to receive warranty coverage.

**To initiate the warranty you must: 1. Complete and return the Installation Checklist to Ramvac.**

**or**

**2. Visit our website at [www.ramvac.com](http://www.ramvac.com) and complete the warranty initiation form.**

All of us at Ramvac appreciate your business and take a personal interest in your satisfaction. Please let us know how the system is working for you. Just give us a call or stop by one of our dental show exhibits.

Ed Holland  
VP/General Manager  
(866) 383-4636

### Safety and Regulatory Information

RAMVACs meet the most current and highest safety standards. RAMVAC Vacuum Units are UL 2601-1 Listed, comply with NFPA 99C Level 3 vacuum requirements, and are manufactured in an FDA registered, ISO 9001:2000 and ISO 13485:2003 certified facility.

Here's what you need to do to insure the safety potential of this equipment is achieved:

- Make sure your equipment is installed according to our written instructions and the Installation Checklist is completed.  
If you have purchased your RAMVAC from an authorized dealer, the dealer is responsible for presenting you with the complete checklist.
- Exhaust from dental vacuum systems can be hazardous. Make sure the exhaust pipe is terminated outside your building according to our written instructions.
- Nitrous oxide and oxygen can be safely scavenged in the small concentrations typically encountered in dental analgesia.  
The additional air drawn into a properly installed and operated Vacuum Unit will dilute these agents. Never use your RAMVAC to remove pure nitrous oxide, oxygen or other oxidizing agents directly from storage vessels or supply hoses. Large concentrations may cause a fire in the Vacuum Unit and may cause an exhaust hazard.
- Never use your RAMVAC to scavenge flammable anesthetic gases. Even small concentrations may cause a fire in the Vacuum Unit.
- Never use your RAMVAC for housekeeping functions.
- Never use your RAMVAC to collect lab dust.
- Dispose of used lubricating oil responsibly as recommended in the maintenance section of the User Guide.

The C2 Control label includes safety symbols with special meanings:



This means there is more information available in this User Guide.



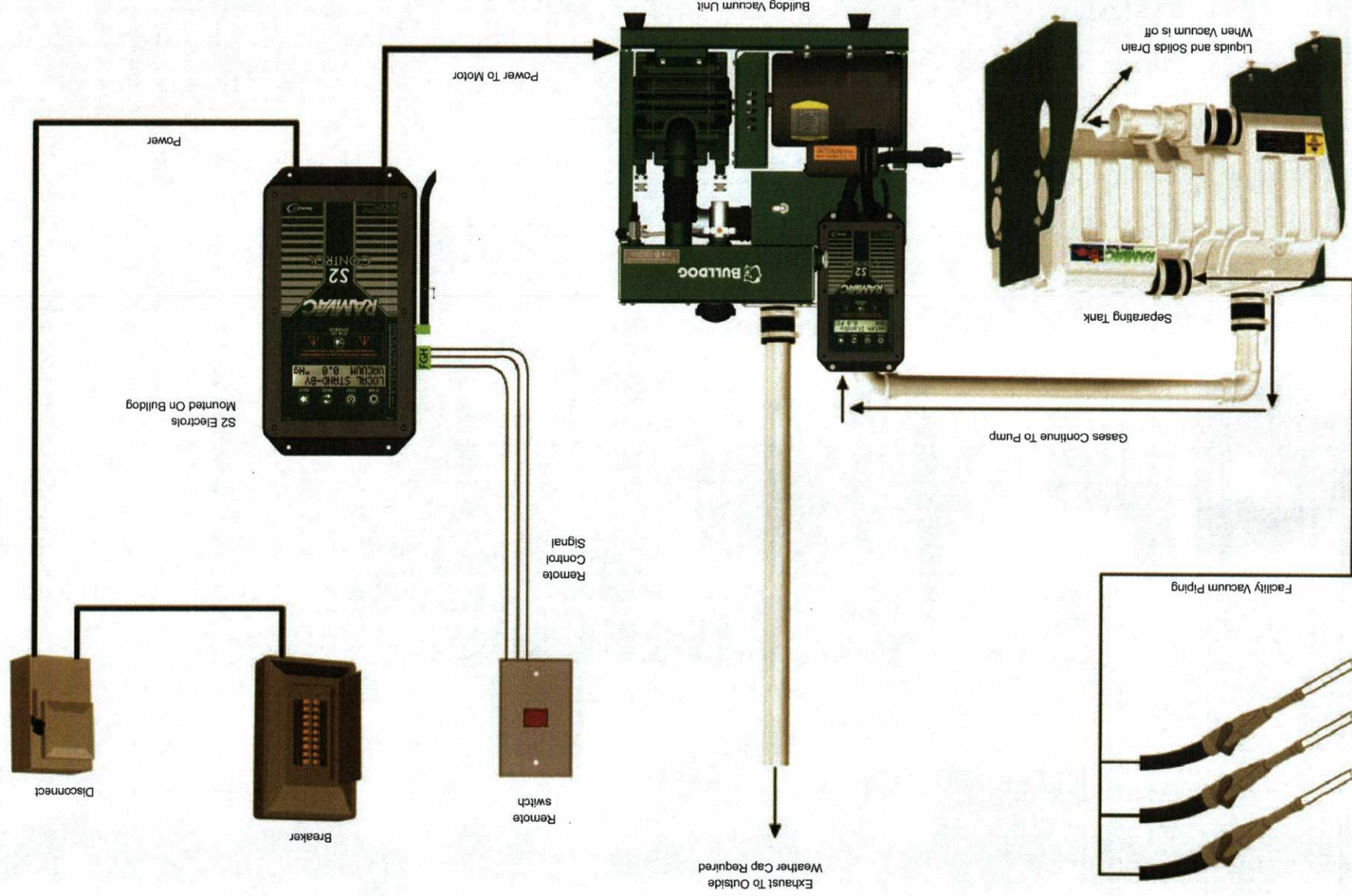
This stands for a "Type B Applied Part", which means the equipment is approved for patient contact.

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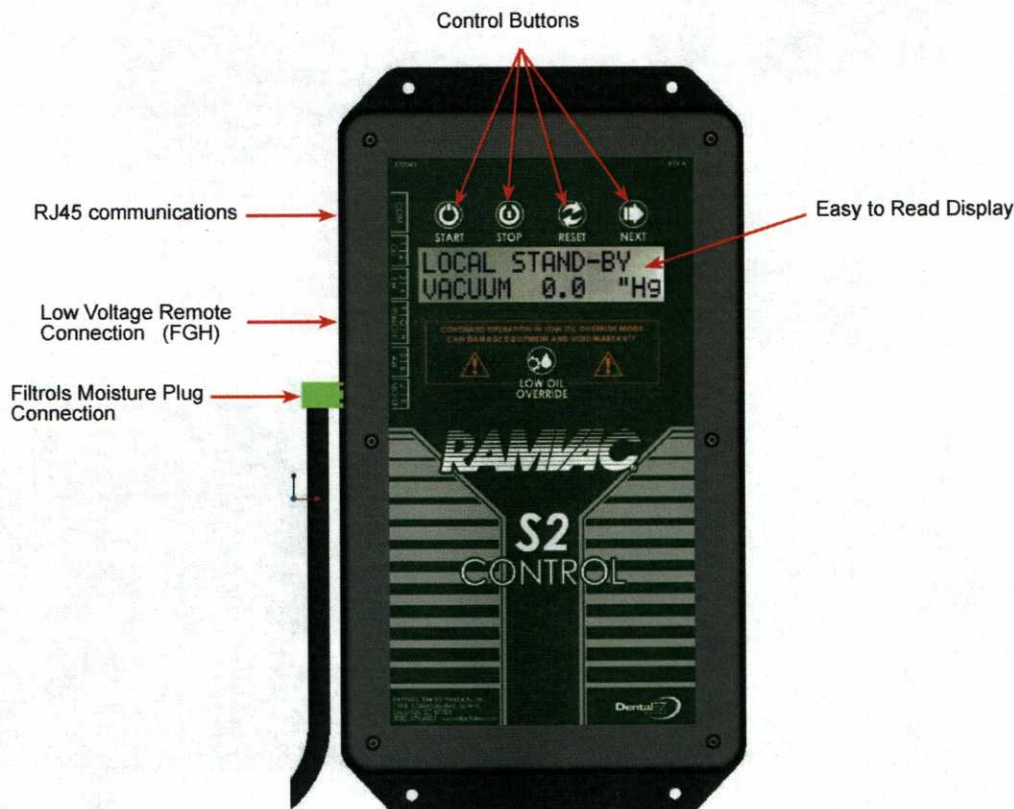


# System Schematic



## S2 Features for Bulldog

- Easy to read digital display.
- Monitors the vacuum pressure and displays it.
- Monitors the system run hours and displays it.
- Monitors the hours until maintenance due and displays it.
- Monitors for "Moisture in Filtrols Shutdown" and displays it when it occurs.



## S2 Shutdown Faults for Bulldog

Fault:	System Status:	Corrective Action:
Filter Maintenance		
Oil Change	System runs normally. Remote switch indicator will flash slowly. S2 and/or OWL Touch will indicate "maintenance due" on the display.	Perform "Preventative Maintenance" Hold reset button until it resets.
Moisture in Filtrols	Can bypass for 15 minutes. Remote switch indicator flashes rapidly.  WARNING! Continued operation bypassing "Moisture in Filtrols" Fault can cause equipment damage not covered by the warranty.	See "If you get a Filtrols Moisture Fault".
Weak Vacuum	Vacuum continues to run with weak vacuum	See "Troubleshooting"



## Maintenance Overview

**RAMVAC** preventive maintenance is simple, clean, and inexpensive.  
It can help ensure your **RAMVAC** provides years of predictable performance.

Key points for trouble-free operation:

- Rinse vacuum lines daily with the recommended quantity of liquid.
- Change oil and check filters on schedule.

### Preventative Maintenance Schedule

1st Week	Check Drip Rate	See "Check Oil Drip Rate"
Daily	Rinse Vacuum Lines	See "Cleaning the Vacuum System"
Every 1,000 hours	Check Air Filters	See "Air Filters"
Every 2,000 hours*	Check Drip Rate Change Oil and check oil filter Check V-Belt	See "Check Oil Drip Rate" See "Oil Change" See "Check V-Belt"

The S2 will display the number of hours before maintenance is due.  
If a Lighted remote switch is installed it will also flash the light indicating that maintenance is due.  
If the OWL Touch is installed it will indicate the maintenance is due on the display.

## Cleaning the Vacuum System

Clean vacuum lines daily. Just before turning off the RAMVAC, rinse vacuum lines first with hot water -- approximately one quart through each high volume line and a few ounces through each saliva ejector line. Then aspirate a few ounces of a dental vacuum line cleaner through each vacuum line. SlugBuster™ is highly recommended. Cleaners should have these qualities:

Non-Foaming:  
De-Odorizing:

Foam may cause a Moisture in Filtrols Fault (See "Moisture in Filtrols Fault") and shut down the Bulldog. Avoid interruptions by insuring your cleaner is truly "non-foaming".

Test by shaking the mixed solution. True "non-foamers" will be bubble free.

Cleaning requirements will vary according to activity. After surgical procedures, aspirate a few ounces of an appropriate vacuum line cleaner, such as SlugBuster, through the lines.

For overhead plumbing, be sure to allow air to follow liquids before closing vacuum valves.

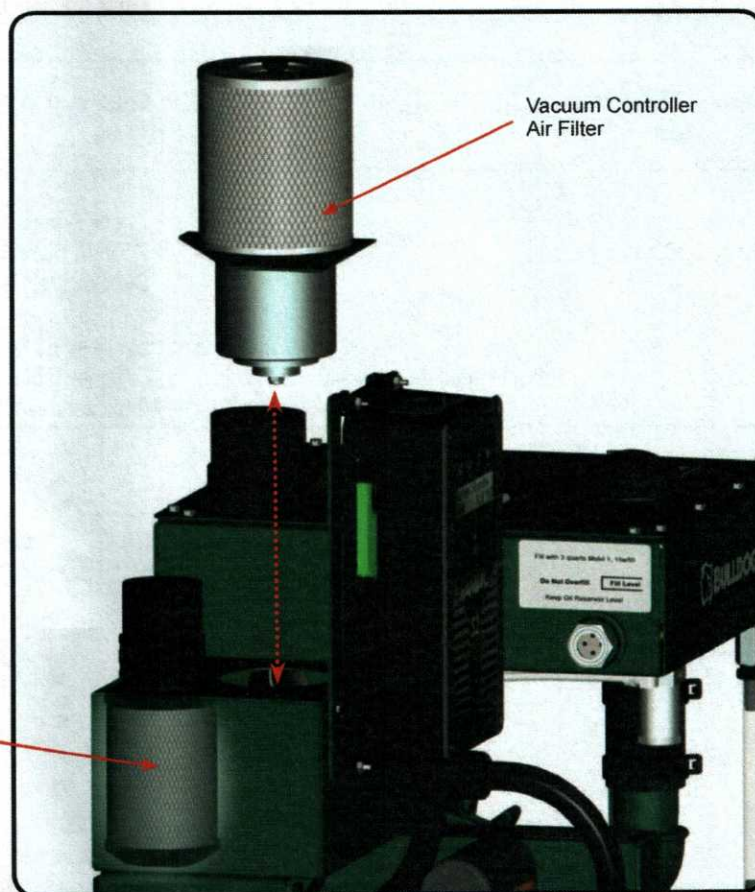
Clean treatment room solids separators routinely. Check the treatment room solids separator routinely and clean when dirty.

## Air Filters

Inspect air filters often. The Main Air Filter is accessed by lifting the Vacuum Controller up and out of the Filtrols.

Replace Filters every 2000 hours or when visibly dirty.

Main Air Filter  
(Inside Filtrols)

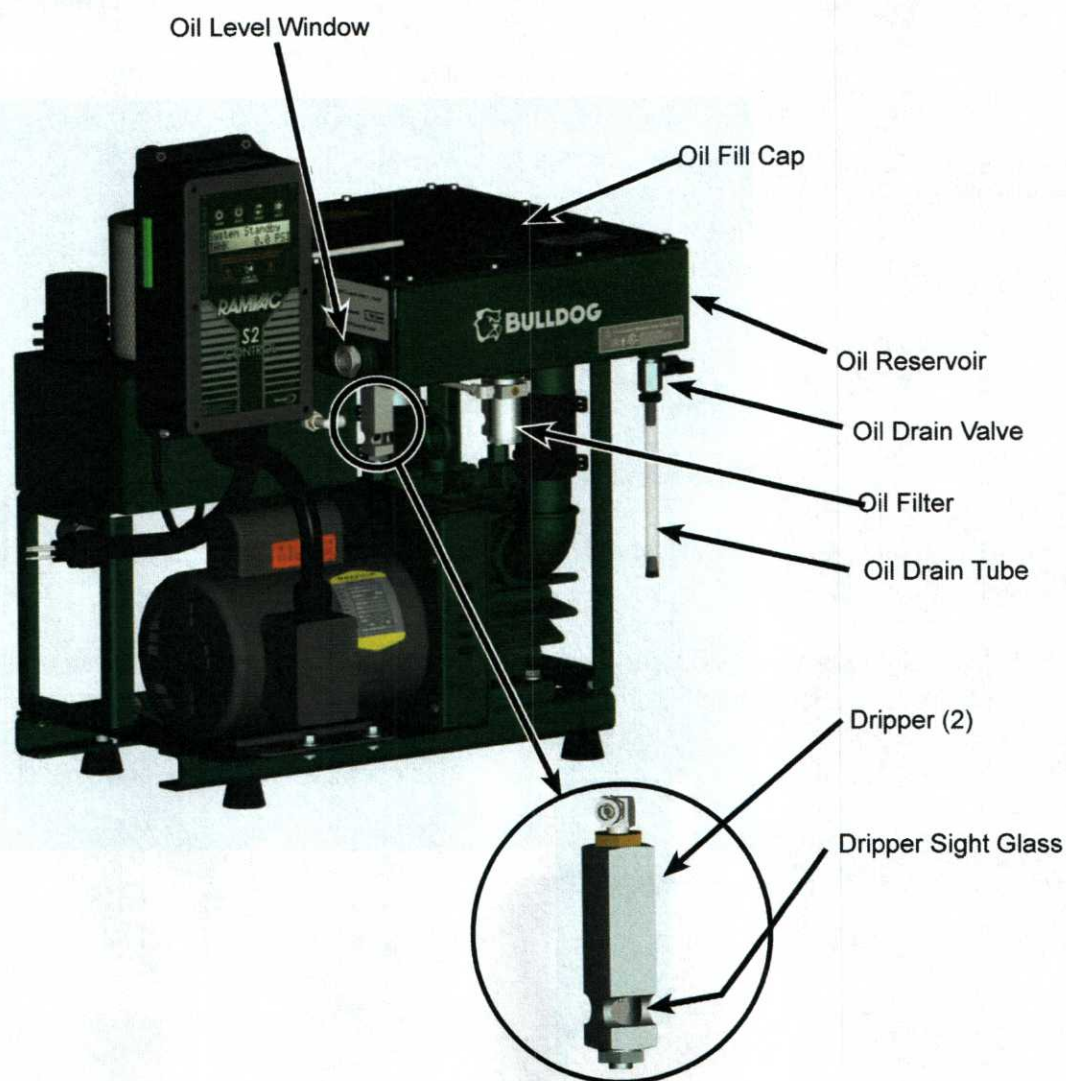




## Lubricating System Components

One reason your **RAMVAC** will outlast every other dental vacuum system is its "Lubrication System". The "Lubrication System" supplies oil drop by drop through "Drippers" to the pump. Used oil is discharged back into the Oil Reservoir as a mist, separated from the exhaust, filtered and recirculated.

Change oil every 2,000 hours.



## Oil Change

" Change Oil " is displayed on the S2 Electrols every 2000 hours .

### Procedure:

1. Drain Used Oil
  - Place empty oil container (minimum 4 quarts) under oil drain tube
  - Open oil drain valve. When oil stops draining, close valve.
  - If you see water in the oil, contact your dealer or RAMVAC.
2. Check Oil Filter
  - Unscrew oil filter and remove filter element.
  - Normally your oil filter element will be clean. If dirty, contact your dealer or RAMVAC.
  - Re-assemble oil filter. Hand tighten only.
3. Add Fresh Oil
  - Remove oil filler cap.
  - Add (normally 3 quarts) Mobil 1, 15w50 until oil level reaches the "Fill Level" mark on the "Oil Level Fill Label".
  - Use only recommended oil, available locally and also available from RAMVAC.
  - Securely install oil fill cap.
  - Check oil drip rate. See "Check Oil Drip Rate"
  - Dispose of used oil at a gas station or lubricant recycling station.
4. Reset "Change Oil"
  - From "Change Oil" screen press and hold the reset button for 5 seconds.

## Check Oil Drip Rate

Check the drip rate at the "Dripper Site Glass" after the first week of operation, after every oil change, and every time the 1000 hour Filter Maintenance displays.

Drip rate should be 1 to 3 drops per minute at each "Dripper" when the Bulldog vacuum unit is thoroughly warmed-up, the vacuum setting is 7" to 7.5" Hg, and ambient temperature is 70°F to 75°F.

Stronger vacuum and/or elevated temperature will increase the drip rate. Weaker vacuum and/or cooler temperature will decrease the drip rate.

If the drip rate is not as specified, contact your dealer or RAMVAC.

## Check V- Belt

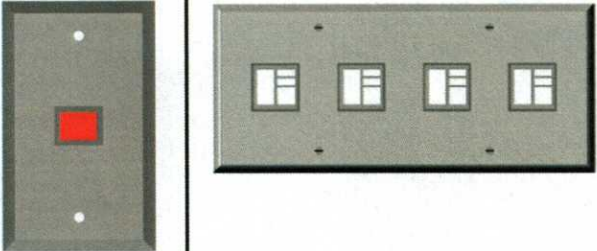
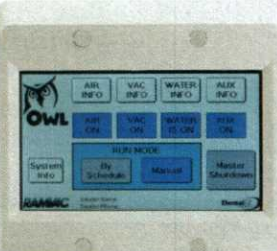

Inspect V-belt for wear every 2,000 hours. Replace if cracked or frayed.

V-belt tension will not normally need adjustment. However, tension will need adjustment if belt squeak at start up. Contact **RAMVAC** for information.

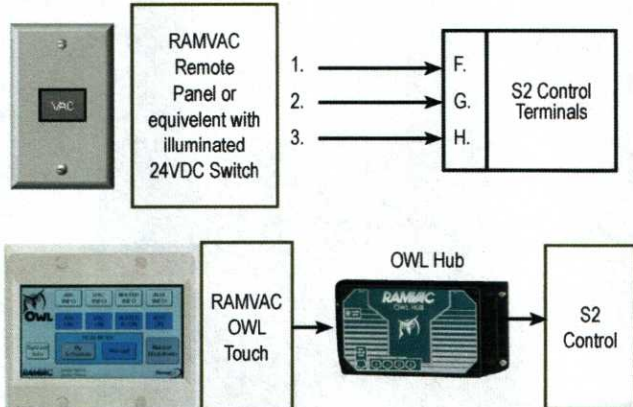


### Low Voltage Remote Switching

The RAMVAC can be run continuously throughout the workday. To avoid wasting electricity, turn off the RAMVAC if vacuum will not be needed for an hour or more. Note: The tank will drain only when no vacuum is present – Vacuum must be turned off at least once per day!

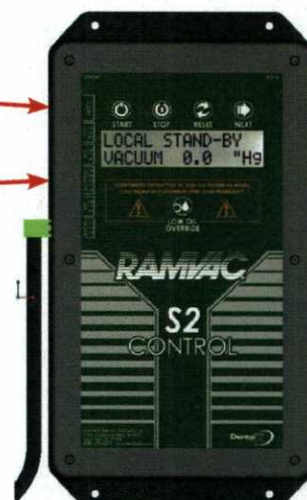
Illuminated Remote Panel	RAMVAC® OWL™ Touch	Non-Illuminated remote Switches
		
<ul style="list-style-type: none"> <li>• Switch light is steady-on when system is running normally.</li> <li>• Switch light flashes for maintenance or one of the heads has been disabled by the disable button on the C2 Control.</li> </ul>	<ul style="list-style-type: none"> <li>• Touch Pad illuminates while equipment is running.</li> <li>• OWL gives complete breakdown of data on selected equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Non-illuminated switches provide no indication for system status.</li> </ul>

### Recommended Switching

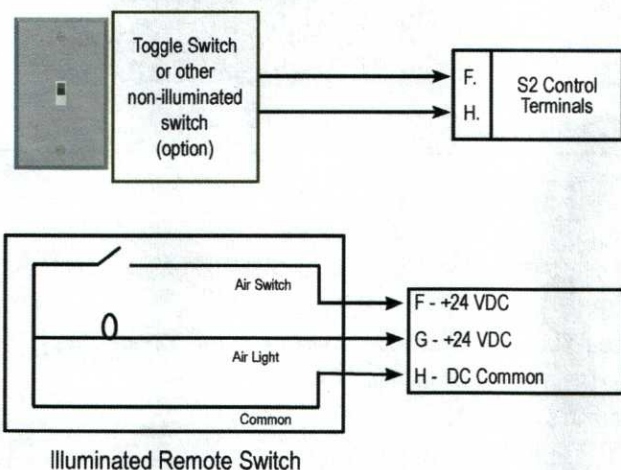


OWL Connection  
"Com"

Low Voltage Switch  
Connection "FGH"



### Alternative Switching



**Note:** Maximum wire length for low voltage 18 gauge wire : 500 feet

**Note:** High Voltage switching is an option but not recommended. Contact RAMVAC.

**Note:** OWL to S2 connection must be made with Cat 6 shielded cable using RJ45 connectors.



### Moisture in Filtrols

Moisture in Filtrols Faults Are Not Normal. This Fault occurs if liquid or foam is present in the "Filtrols" (normally a dry location).

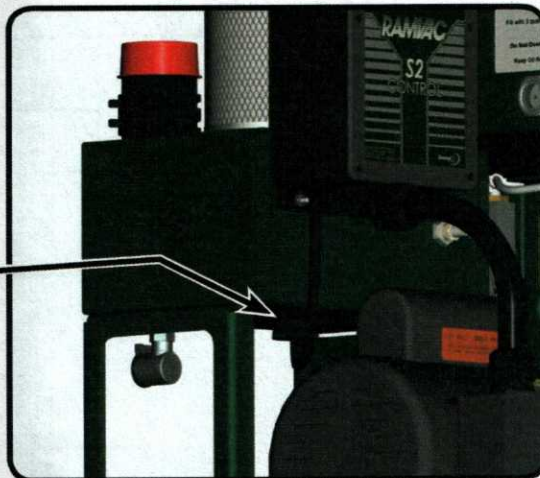
Operating while there is a Moisture in Filtrols Fault Can Damage Equipment and Void the Warranty.

If a Moisture Fault recurs, call your dealer or RAMVAC.

### If You Get a Moisture in Filtrols Fault

1. Press the S2 Electrols "Next" button.
  - The S2 display will show that it is a "Filtrols Moisture" alarm.
2. Determine and correct the cause. Always Determine the Cause of a Moisture Fault!
  - See "To Avoid Moisture Faults" below.
3. If you try to operating while there is a Moisture in Filtrols Fault this can damage equipment and will "Void the Warranty".
4. Clear the Moisture.
  - Allow the Separating Tank to drain.
  - Lift off the Vacuum Controller, remove Main Air Filter. Clean out any remaining moisture.
  - Remove Moisture Sensor (by twisting and pulling down) and dry contacts. See illustration at right.
  - Install Moisture Sensor, Main Air Filter and Vacuum Controller.
  - Press the S2 Electrols "Next" button to show the "Moisture in Filtrols Shutdown".
  - Press the S2 Electrols "Reset" button and hold for 5 seconds.
  - RAMVAC will start.
  - When convenient, continue with step 4.
5. Reset the Flashing Remote Switch Indicator
  - Cycle the remote switch off, then on.
  - As soon as possible, continue with step 5.

Moisture Probe



### To Avoid Moisture Faults

- Aspirate only non-foaming substances.  
See Note at right
- Rinse lines with a known quantity of water.
- Do not exceed your separating tank's capacity.

Note: Check any suspicious substances by shaking in a glass container.  
Be sure to check:

- Vacuum Line Cleaners (even those that say "non-foaming")
- Cold Disinfecting Solutions
- Ultrasonic Solutions



Problem	Possible Cause	Corrective Action*
Low or No Vacuum (motor running okay)	Tank Drain Valve Blocked Open .....	Clean Tank Drain Valve
	Clogged Vacuum Line .....	Locate and remove clog
	Filtrols Check Valve Not Sealing .....	Repair or replace Check Valve
	Vacuum Leaks .....	Locate and fix leaks
	Loose or Broken Drive Belt .....	Tighten or replace Belt
	Stuck Vanes .....	Clean and lubricate Vanes
Motor Does Not Run	"Tripped" Breaker or Fuse .....	Reset Breaker / Replace Fuse
	"Tripped" Motor Overload .....	Reset Motor Overload
	Motor Failure .....	Replace Motor
	Failed Control Component .....	Bypass then replace failed component
	Filtrols Moisture Fault .....	See "Filtrols Moisture Fault"
Drip Rate Slow	Low Ambient Temperature .....	Raise ambient temperature
	Dirty Oil Filter .....	Clean Filter
	Improper Oil .....	Change to recommended oil
Drip Rate Fast	High Ambient Temperature .....	Lower ambient temperature
	High Vacuum Pressure .....	Lower vacuum pressure
	Improper Oil .....	Change to recommended oil
Oil Comes Out Exhaust	Incorrect Exhaust Installation .....	Correct Installation
	Oil Reservoir Overfull .....	Lower oil level
	Bypassed Moisture Fault .....	See "Filtrols Moisture Fault"
"Filtrols Moisture " Fault	Separating Tank overfilled .....	Drain Separating Tank
	Separating Tank Drain Valve Stuck .....	Clean Separating Tank Drain Valve
	Foaming Line Cleaner used .....	Use "Slugbuster" Line Cleaner
	Cold Sterilization Solution aspirated .....	Aspirate only non-foaming substances
Maintenance Required	Preventative Maintenance Due .....	Perform Preventative Maintenance

\*Abbreviated information. For details contact your authorized dealer or RAMVAC, or refer to the "Support" section of [ramvac.com](http://ramvac.com)



**RAMVAC® Product Support Services**

The DentalEZ Group and its employees are proud of the products we provide to the dental community. We stand behind these products with a warranty against defects in material and workmanship as provided below.

In the event that you experience difficulty with the application or operation of any of our products, please contact our customer service department at our expense at (866) DTE-INFO.

If we cannot resolve the issue by telephone, we will arrange for a representative to contact you or suggest that the product be returned to our factory for inspection.

If product return or repair is required, we will provide you with a Return Authorization number and shipping instructions to return the product to the proper facility. If the product is under warranty we will ask you to provide proof of purchase such as a copy of your invoice. Please be sure to include the Return Authorization number on the package you are returning. Products returned without a return authorization number cannot be repaired.

Freight costs for product returns are the responsibility of the customer. Products under warranty will be repaired or replaced, at our sole discretion, and returned at our expense. Products outside the warranty limits will be repaired and returned with costs invoiced to the customer. We are not responsible for shipping damages. We will, however, help you file a claim with the freight carrier. Written repair estimates are available.

DentalEZ warrants all equipment and parts to be free of defects in material and workmanship, under normal usage, under the following terms:

RAMVAC Products:	Warranty Period:
RAMVAC® Dental Vacuum System	2 Years from date of installation*
RAMVAC® Vacuum Pumps only	10 Years from date of installation*
RAMVAC® OWL™	2 Years from date of installation*
CustomAir® by RAMVAC®	6 Years / 4200 hours from date of installation*

Please note the following additional terms of our warranty and return policy:

- Warranties cover manufacturing defects only and do not cover defects resulting from abuse, improper handling, cleaning, care or maintenance, normal wear and tear or non-observance of operating, maintenance or installation instructions. Failure to use authorized parts or an authorized repair facility voids this warranty.
- Liability is limited to repair or replacement of the defective product at our sole discretion. All other liabilities, in particular liability for damages, including, without limitation, consequential or incidental damages are excluded.
- This warranty is in lieu of all other warranties, expressed or implied, including ANY IMPLIED warranties of merchantability or fitness for a particular purpose. no employee, representative or dealer is authorized to change this warranty in any way or to grant any other warranty.

**WARRANTY REPAIRS:**

Parts repaired or replaced on a product that is in warranty will be warranted for the duration of that product's original warranty.

**NON-WARRANTY REPAIRS:**

The warranty on parts either repaired or replaced on an out-of-warranty product will cover the repaired part only and will be for the timeframe of a new parts warranty period.

**PRODUCT RETURN:**

Opened products or product returns more than a year old cannot be returned for credit. There will be a 15% (\$25.00 minimum) restocking charge on all items authorized for return.

\*When installed, operated and maintained in accordance with written instructions.

RAMVAC, Bison, Bulldog, FLOWCHECK, Ramclean and VACHECK are registered trademarks and InfiniTank, OWL and SlugBuster are trademark of RAMVAC Dental Products, Inc.







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