BULLDOG

DENTAL VACUUM SYSTEM



OPERATION, MAINTENANCE AND USER MANUAL

TECHNICAL DESCRIPTION:

The RAMVAC Bulldog QT Vacuum System utilizes an oil lubricated, rotary vane, positive displacement pump to provide a reliable vacuum source for the Dental office. This vacuum unit is intended solely for the removal of dental waste material from the oral cavity during dental procedures.

The pump is powered via a belt drive system by an electric motor that is controlled by the S2 Control System. The S2 Control is an electronic, smart control that utilizes a microprocessor and sensors to monitor the vacuum system and provide alarms or reminders of system needs.

A drip oiling system meters lubricating oil into the pump and is then removed from the airflow by filters inside the oil reservoir, creating a closed loop system.

Notifications and Cautions

Thank you for selecting RAMVAC to serve your dental facility. RAMVAC provides industry leading technology for convienient 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 vacuum system 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 recieve 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 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 five us a call or stop by one of our dental show exhibits.

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, 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. Never use this equipment in an OXYGEN RICH ENVIRONMENT. 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.

WARNING

TO AVOID RISK OF ELECTRIC SHOCK, THIS EQUIPMENT MUST ONLY BE CONNECTED TO A SUPPLY MAINS WITH PRETECTIVE EARTH.

WARNING

ELECTRICIAN MUST PROVIDE A MEANS TO ISOLATE THE CIRCUIT ELECTRICALLY FROM THE SUPPLY MAINS ON ALL POLES SIMULTANEOUSLY.

Operating and Shipping Conditions

AMBIENT CONDITIONS: This utility room equipment is designed to operate in the temperature range designated below. The utility room environment may require additional ventilation and HVAC accommodations in order to maintain an acceptable environment. The operating temperature listed is to be maintained under worst case conditions taking into account seasonal temperature changes.

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- Maximum Operating Temperature: 104°F
- Minimum Operating Temperature: 32°F
- Operating Relative Humidity Range: 0 -95%, No condensing moisture.
- Operating Atmospheric Pressure Range: 63 - 105 kPa
- Maximum Shipping/Transport Temperature: 165°F
- Minimum Shipping/Transport Temperature: -20°F
- Shipping/Transport Relative Humidity Range: 0 -95%

The Bulldog Vacuum Unit labels include safety symbols with special meanings:

 This means there is more information available in this User Guide.	 This means "hot surface. Be aware of the risk of burns if touched".	 Used to advise the operator to consult the accompanying documents.
 This notifies handlers that the box must remain upright at all times.	 This notifies handlers that this box should never be stacked.	 This notifies handlers of the safe temperature range for the contents in box.
 This notifies handlers of the safe humidity range of the contents in the box.	 This notifies users to be aware of biohazardous materials that may be present.	

EMC INFORMATION

Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in this manual.

Portable and mobile RF communications equipment can affect Medical Electrical Equipment."

The use of Accessories, transducers, and cables other than those specified, with the exception of transducers and cables sold by the Manufacturer of this device as replacement parts for internal components, may result in increased Emissions or decreased Immunity of the Bulldog.

The Bulldog should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, the Bulldog should be observed to verify normal operation in the configuration in which it will be used.

Guidance and manufacturer's declaration –electromagnetic emissions

The Bulldog is intended for use in the electromagnetic environment specified below. The customer or the user of the Bulldog should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The Bulldog uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The Bulldog is suitable for use in all establishments other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations / flicker emissions IEC 61000-3-3	Not applicable	

Guidance and manufacturer's declaration –electromagnetic immunity

The Bulldog is intended for use in the electromagnetic environment specified below. The customer or the user of the Bulldog should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±2 kV contact ±4 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/ burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±0.5 kV for power supply lines Not applicable for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV line(s) to line(s) ±2 kV line(s) to earth	±1 kV line(s) to line(s) ±2 kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % UT (>95 % dip in UT) for 0,5 cycle 40 % UT (60 % dip in UT) for 5 cycles 70 % UT (30 % dip in UT) for 25 cycles <5 % UT (>95 % dip in UT) for 5 sec	<5 % UT (>95 % dip in UT) for 0,5 cycle 40 % UT (60 % dip in UT) for 5 cycles 70 % UT (30 % dip in UT) for 25 cycles <5 % UT (>95 % dip in UT) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the [EQUIPMENT or SYSTEM] requires continued operation during power mains interruptions, it is recommended that the [EQUIPMENT or SYSTEM] be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A / m	Not applicable	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE UT is the a.c. mains voltage prior to application of the test level.

EMC INFORMATION

Guidance and manufacturer's declaration –electromagnetic immunity

The Bulldog is intended for use in the electromagnetic environment specified below. The customer or the user of the Bulldog should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	Does Not Comply	Portable and mobile RF communications equipment should be used no closer to any part of the Bulldog, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2,5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a]should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol: 
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2,5 GHz	Does Not Comply	

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the [ME EQUIPMENT or ME SYSTEM] is used exceeds the applicable RF compliance level above, the [ME EQUIPMENT or ME SYSTEM] should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the [ME EQUIPMENT or ME SYSTEM].

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the Bulldog

The Bulldog is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Bulldog can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Bulldog as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2,5 GHz $d = 2.3\sqrt{P}$
0,01	0.12	0.12	0.23
0,1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

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WARNING

No modification of this equipment is allowed. Modification will void the manufacturers warranty.

WARNING

Installation information available in RAMVAC Document 1067DOC
titled “Dental Vacuum System Installation”

Electrical Ratings

60 Hz Models

MODEL	MOTOR				THHN Wire Size[1]		PROTECTION[2,3]	
	Hp (kW)	Phase	Voltage[4]	Max Amps	50 ft.	100 ft.	Breaker[2]	Fusetron[3]
Bulldog QT 1, 2 60 Hz	1.0 (0.7)	1	115v (104-127)	9 A	12 ga.	10 ga.	20 amp	FRN 25
			230v (208-253)	4.5 A	12 ga.	12 ga.	15 amp	FRN 8

NOTES:
1. Recommendation only. Ensure compliance with National and Local codes.
2. Fuses must have time delays or be otherwise suitable for motor circuit.
3. Disconnect must be fusible and sized per UL 98, UL 489, or UL 508. Must be supplied and installed by a licensed electrician.
4. Motors are NEMA rated. See NEMA guidelines for applicable voltage and frequency range.

50 Hz Models

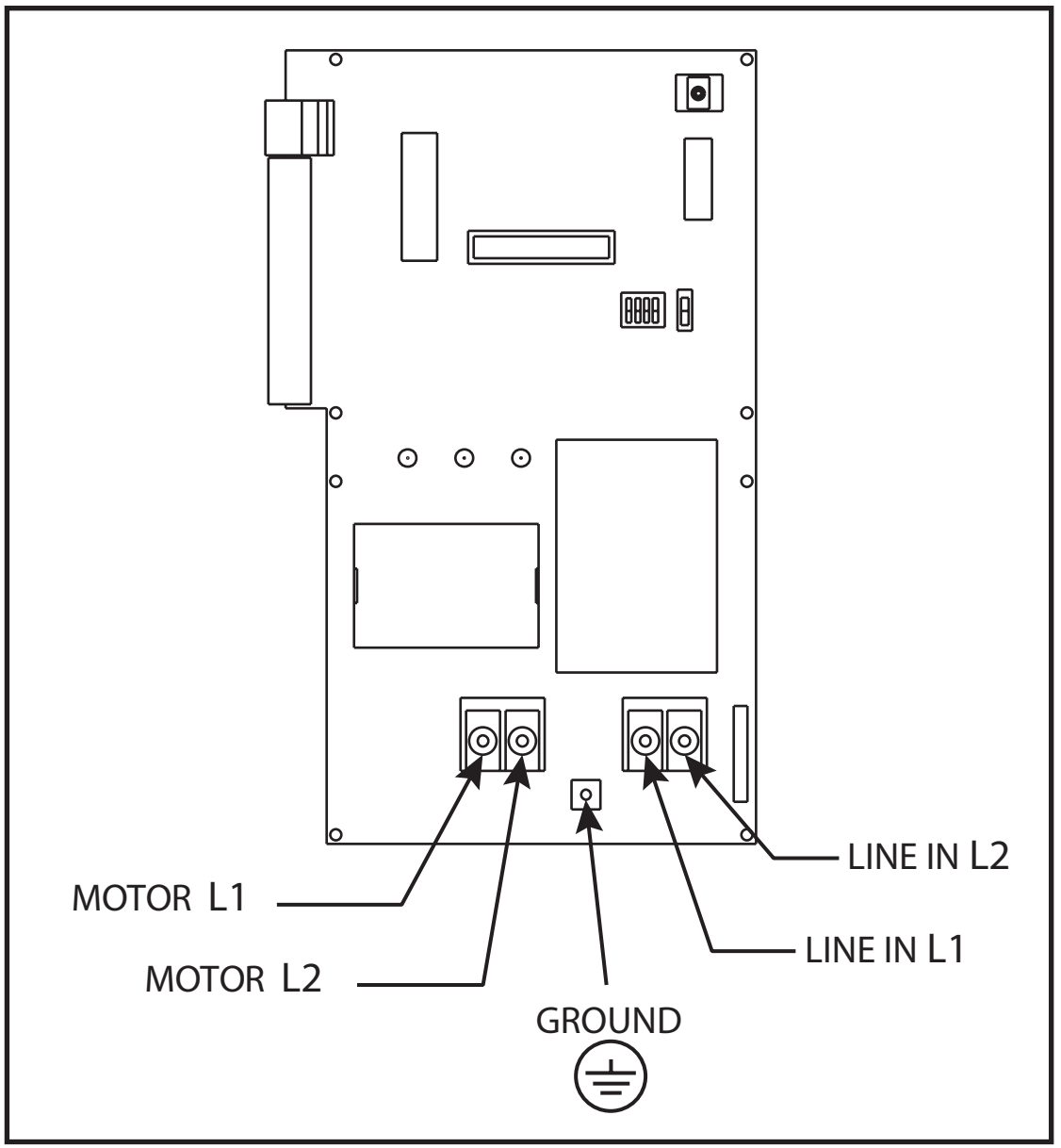
MODEL	MOTOR				THHN Wire Size[1]		PROTECTION[2,3]
	Hp (kW)	Phase	Voltage[4]	Max Amps	50 ft.	100 ft.	Breaker[2]
Bulldog QT 1, 2 50 Hz	1.5 (1.1)	1	110v (99-121)	19 A	12 ga.	10 ga.	20 amp
			220v (198-242)	10 A	12 ga.	12 ga.	15 amp

NOTES:
1. Recommendation only. Ensure compliance with National and Local codes.
2. Fuses must have time delays or be otherwise suitable for motor circuit.
3. Disconnect must be fusible and sized per UL 98, UL 489, or UL 508. Must be supplied and installed by a licensed electrician.
4. Motors are NEMA rated.

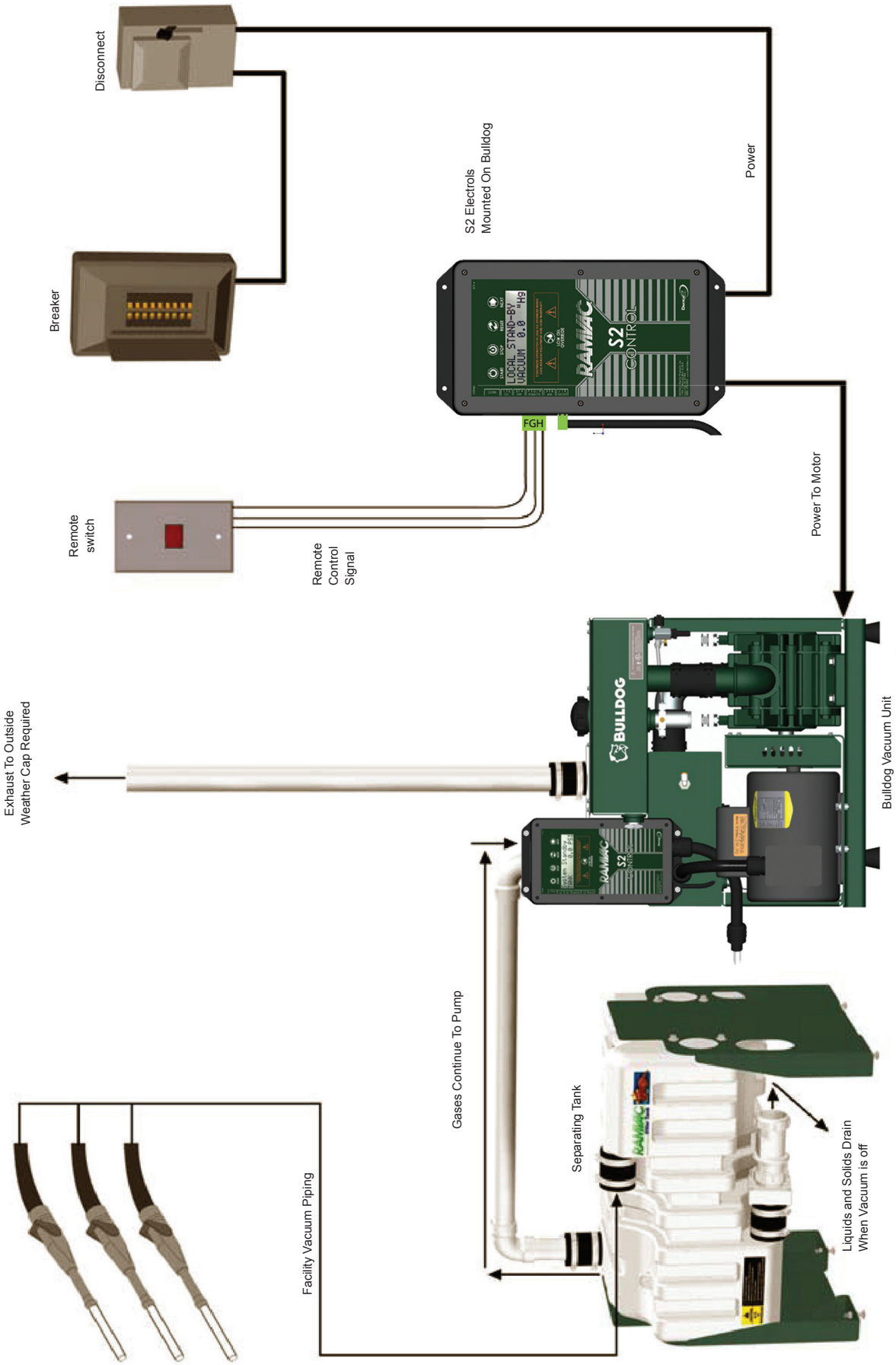
FUSE TYPE AND RATING:
For vacuum units with Motor Starter Control Enclosures, see Electrical Specs label for fuse type and rating.

Electrical Connection

S2 Logic Board

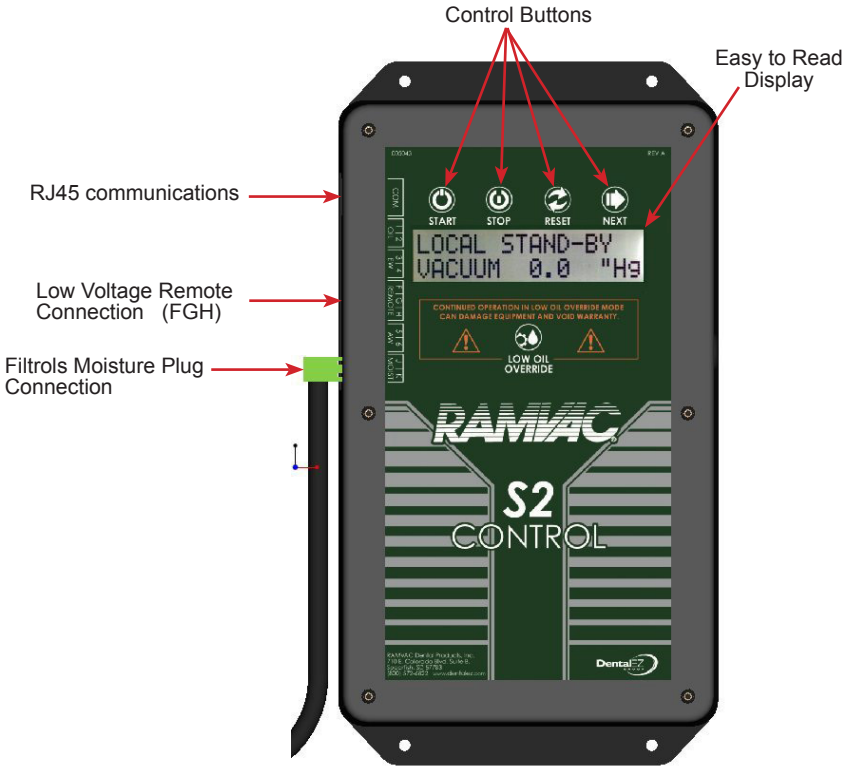


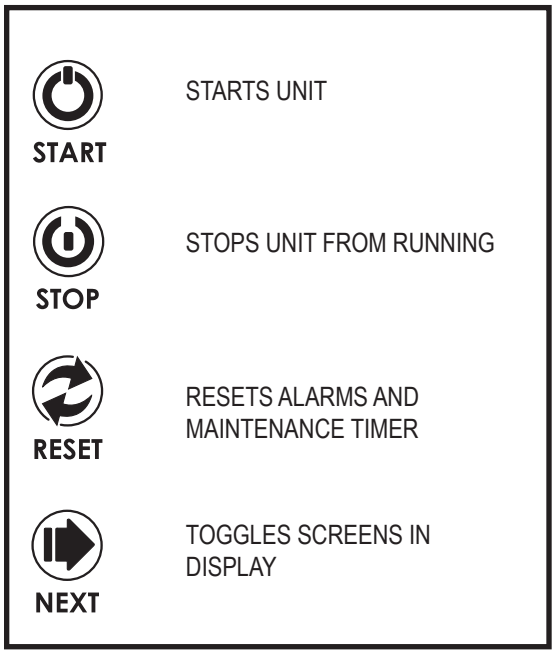
System Schematic



S2 Features for Bulldog

- Easy to read digital display.
- Monitors the vacuum pressure and displays it. Digital pressure sensor accuracy is +/- 0.25% FSS BFSL (Full Scale Span Best Fit Straight Line). Total error band of 2% full scale span maximum.
- Monitors the system run hours and displays it.
- Monitors the hours until maintenance due and dispays it.
- Monitors for “Moisture in Filtrols Shutdown” and diplays it when it occurs.





S2 Shutdown Faults for Bulldog

Fault:	System Status:	Corrective Action:
Maintenance Due	System runs normally. Remote switch indicator will flash slowly. S2 and/or OWL Touch will indicate maintenance is due on the display.	Perform “Preventative Maintenance” Hold reset button until it resets.
Moisture in Filtrols	S2 displays “Moisture in Filtrols Shutdown” and shuts the system down. Remote switch indicator flashes rapidly. WARNING! Continued operation attempting to bypass a “Moisture in Filtrols” Fault can cause equipment damage not covered by the warranty.	See “ If you get a “Moisture in Filtrols Fault” and “Troubleshooting”.
Low Oil	S2 Displays “Low Oil Shutdown” and continues to run for 8 hours. Remote switch indicator flashes rapidly.	See “Troubleshooting” section.

NOTE

TO CLEAR ALARMS: Press “NEXT” button to identify which alarm is activated. Correct the problem condition. Once condition is corrected, press the “RESET” button to clear the alarm.

Maintenance Overview

RAMVAC preventive maintenance is simple, clean, and inexpensive, however we recommend that all maintenance and service be provided by a trained dealer service technician.
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.

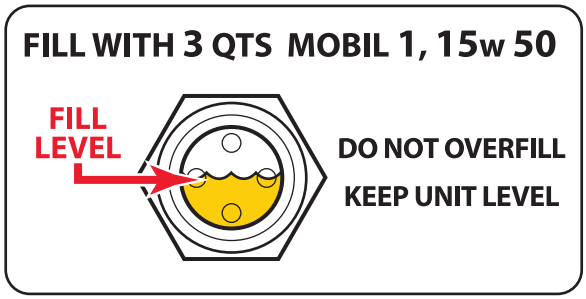
Upon request, RAMVAC will provide circuit diagrams, component parts lists, descriptions, calibration instructions, or other information to assist service personnel to repair parts.

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.

Oil Fill Level



To read correctly, get eye level with sight glass while unit is sitting level, and check that oil level is even with the head of the red arrow. Add or drain oil accordingly.

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:	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".
De-Odorizing:	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.

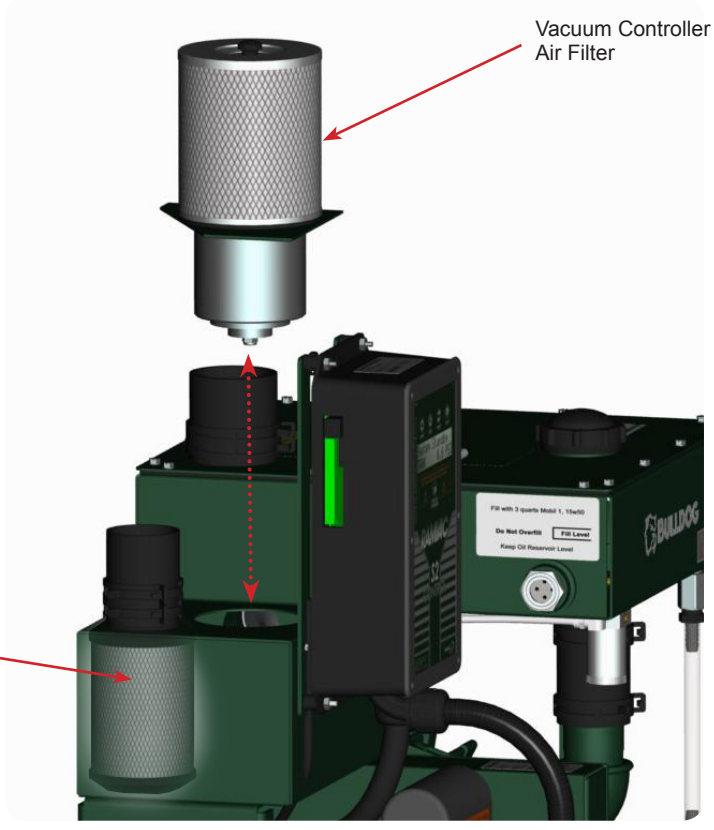
Cleaning Unit

1. Always disconnect the power from the equipment prior to cleaning.
2. Some parts on the vacuum get hot during operation. Provide the unit ample time to cool prior to cleaning.
3. All components can be safely wiped down with a damp cloth, wet with water. We do not recommend using any cleaners or harsh chemicals to clean this equipment since their potentially harmful effects have not been evaluated.
4. Do not heavily wet electrical components
5. Allow equipment to air dry or dry with clean, soft cloth.

Air Filters

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

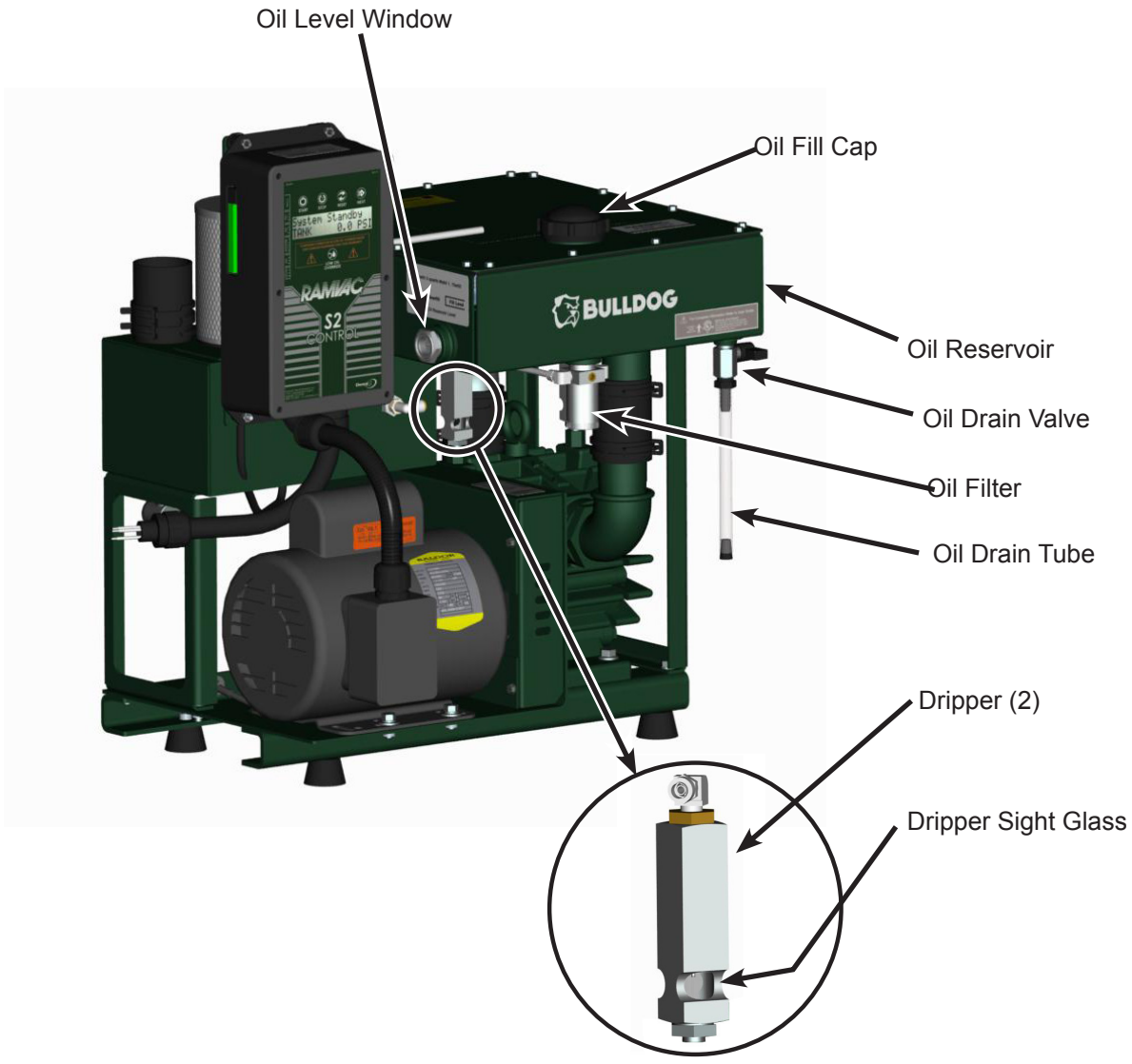
Replace Filters every 2000 hours or when visibly dirty.



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 3 quarts Mobil 1, 15w50. Check Oil Fill Level at sightglass and add or drain oil accordingly. (see pg. 9).
   - 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 70ºF to 75ºF.

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.

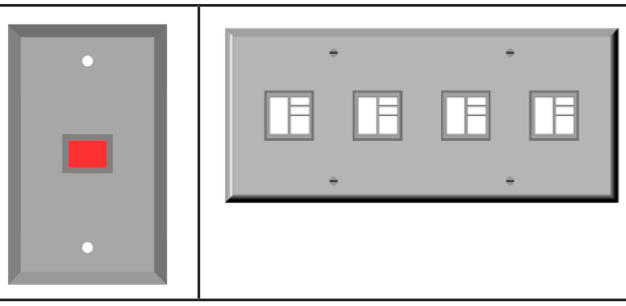
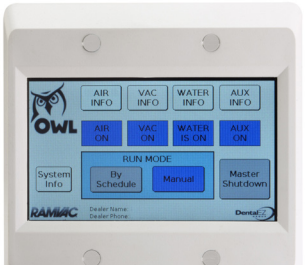
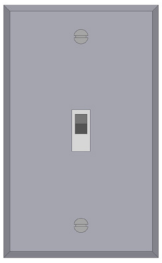
Check V- Belt

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

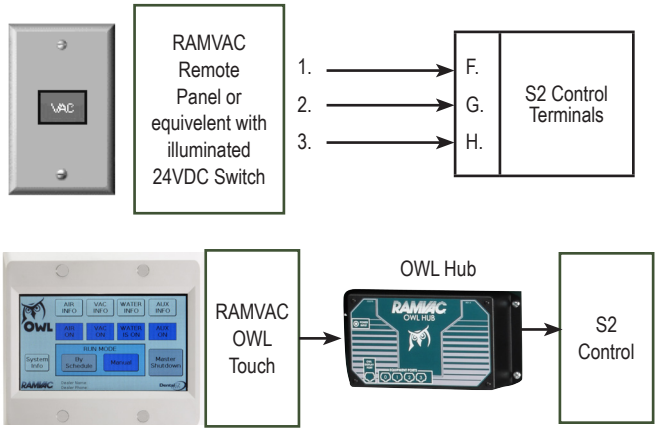
V-belt tension will not normally need adjustment. However, tension will need adjustment if belt squeak at start up.
Contact **RAMVAC** for information.

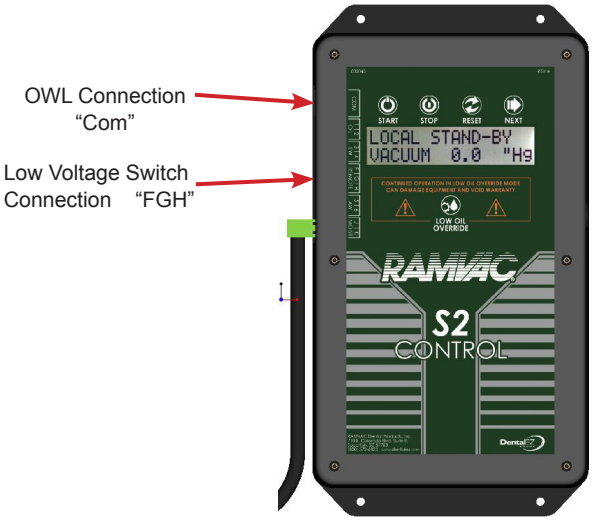
Low Voltage Remote Switching

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!

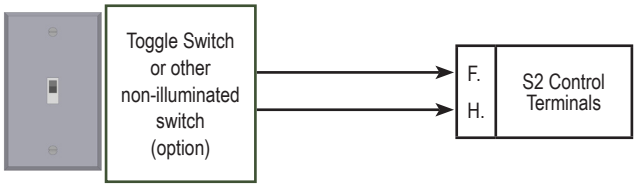
Illuminated Remote Panel	RAMVAC® OWL™ Touch	Non-Illuminated remote Switches
		
• Switch light is steady-on when system is running normally. • Switch light flashes for maintenance or one of the heads has been disabled by the disable button on the C2 Control.	• Touch Pad illuminates while equipment is running. • OWL gives complete breakdown of data on selected equipment	• Non-illuminated switches provide no indication for system status.

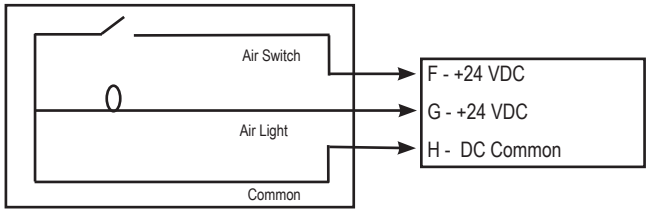
Recommended Switching





Alternative Switching





Illuminated Remote Switch

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

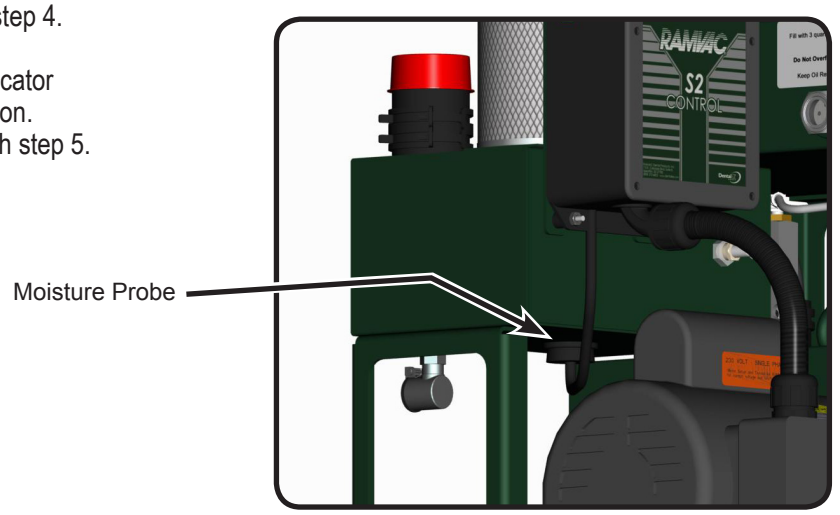
1. Press the S2 Electrols "Next" button.
   - The S2 display will show that it is a "Filtrols Moisture" alarm.

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.



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

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 warranteed 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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