Dental Vacuum System
Installation Overview

This guide contains site preparation and installation instructions for RAMVAC® Bulldog® QT and Bison® Dental Vacuum Systems with S2 Electrols.

It is recommended that this equipment only be installed by licensed electrical and plumbing contractors.

Step 1 Site Requirements

Step 2 Tank Plumbing

S-Type Exhaust Filter
Standard on Bison 7 and 9.
Optional on Bison 3, 5 and all Bulldog models.

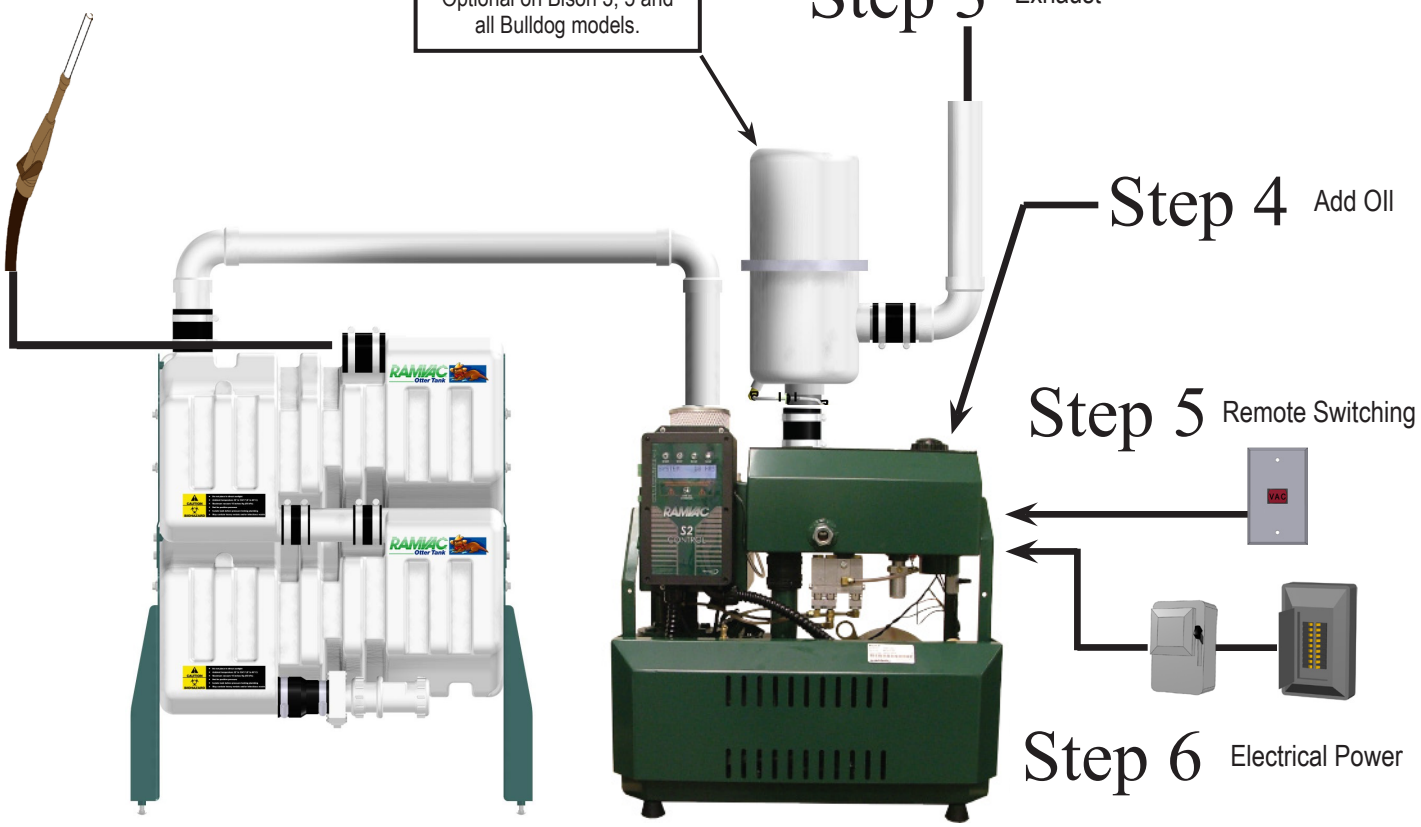
Step 3 Exhaust



Step 4 Add Oil

Step 5 Remote Switching

Step 6 Electrical Power



Step 7 Installation Checklist (Separate Document)



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A Brand of the DentalEZ GROUP

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SEE USER MANUAL FOR:

- Safety and Regulatory Information
- Operating and Shipping Conditions
- EMC Information

WARNING

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

Technical Description

The RAMVAC Bulldog QT and Bison Vacuum Systems 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.



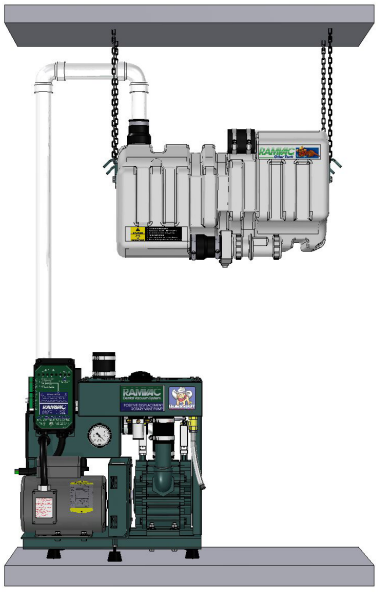


Bulldog® QT
Site Requirements

Comply with Local and National Electrical and Plumbing Codes. Follow NFPA 99c Edition, Level 3 Vacuum System Recommendations.	Ambient Temperature 32° to 104° F (0° to 40° C)	Protect from Water. Controls are NOT waterproof. Motors are NOT Waterproof.	Humidity 0% to 95% No Condensing Moisture

Common Installations Shown
Contact RAMVAC for more options

It is recommended that this equipment only be installed by licensed electrical and plumbing contractors.



Bulldog - 15 Gallon Otter Tank suspended

Bulldog - 15 Gallon Otter Tank™ stacked



Bulldog -15-Gallon Otter Tank side by side



Product Dimensions	15-Gallon Otter Tank	Bulldog QT 1 & 2	Bulldog-15 Gallon Otter Tank Stacked
Nominal Width	25” (640 mm)	21” (520 mm)	25” (640 mm)
Nominal Depth	19” (490 mm)	17” (430 mm)	19” (490 mm)
Nominal Height	24” (610 mm)	28” (640 mm)	44” (1120 mm)
Nominal Height with S-Type Exhaust Filter	N/A	48” (1220 mm)	67” (1700mm)
Drain valve centerline to floor	8” (203 mm)	N/A	8” (203 mm)

Add 6” (155 mm) to each dimension for working space

Bison®
Site Requirements

Comply with Local and National Electrical and Plumbing Codes. Follow NFPA 99c Edition, Level 3 Vacuum System Recommendations.	Ambient Temperature 32° to 104° F (0° to 40° C)	Protect from Water. Controls are NOT Waterproof. Motors are NOT Waterproof.	Humidity 0% to 95% No Condensing Moisture

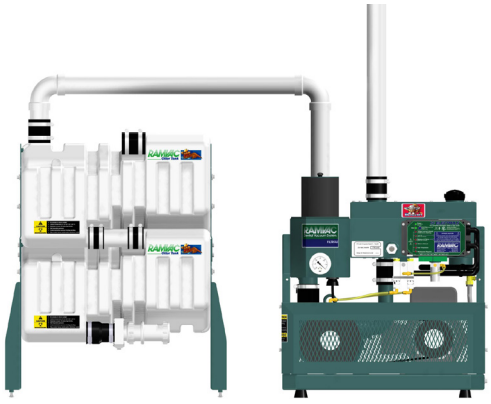
Common Installations Shown
Contact RAMVAC for more options

It is recommended that this equipment only be installed by licensed electrical and plumbing contractors.

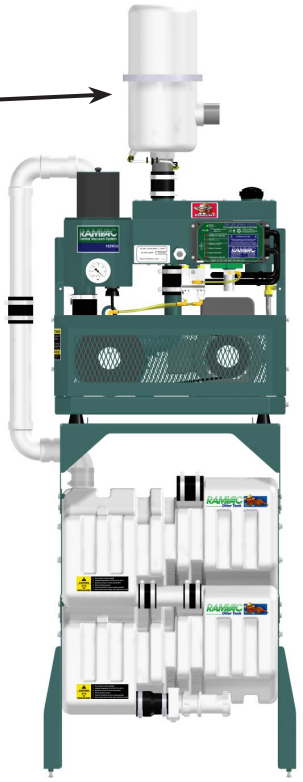


S-Type Exhaust Filter *
Standard on Bison 7 and 9.
Optional on Bison 3, 5, and all Bulldog models.

Bison - 50 Gallon Tank
side by side



Bison - 30 gallon Otter Tank
side by side



Bison - 30-Gallon Otter Tank
stacked using Bison Platform

Product Dimensions	30-Gallon Otter Tank	Bison 3 & 5	Bison - 30 gallon Otter Tank Stacked	Bison 7 & 9	50-Gallon Cylindrical Tank
Nominal Width	29” (740 mm)	26” (660 mm)	32” (820 mm)	26” (660 mm)	22” (560mm)
Nominal Depth	21” (540 mm)	19” (490 mm)	21” (540 mm)	22” (560 mm)	22” (560mm)
Nominal Height	36” (920 mm)	30” (760 mm)	70” (1780 mm)	30” (765 mm)	62” (1580mm)
Drain valve centerline to floor	8” (203 mm)	N/A	8” (203 mm)	N/A	5” (130mm)
* For S-type Exhaust Filters add 26 inches to height of Power Unit.					

Add 6” (155 mm) to each dimension for working space.

Tank Plumbing

Facility Vacuum Lines

- Build Like a Drain Line:
  - Use DWV Fittings
  - Minimum slope ¼" per 10 ft (2 mm per 1m)
- Up to 5 rooms: 1-1/2" (or larger) PVC Schedule 40 or equivalent
- 5 to 15 rooms: 2" PVC (or larger) Schedule 40 or equivalent
- If an inline low spot is unavoidable, place it in a known location and incorporate a clean-out.
- For overhead piping, contact RAMVAC
- For nitrous oxide scavenging, contact RAMVAC
- Follow NFPA 99c Edition, RAMVAC Instructions, and local codes.

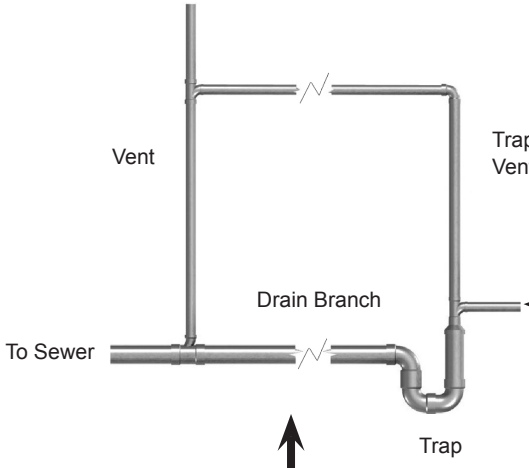
Tank to Vacuum Power Unit

Bulldog®- 1 1/2" PVC Schedule 40 with DWV fittings or equivalent.

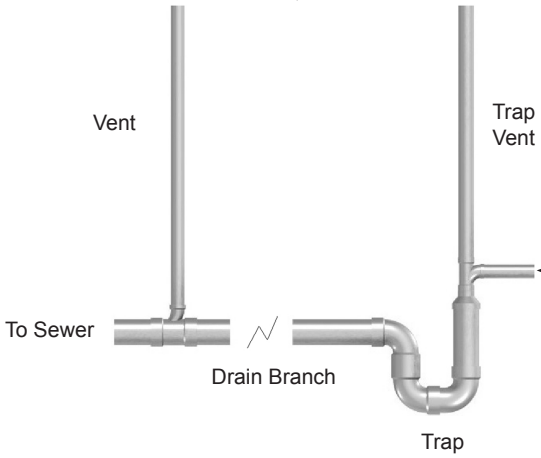
Bison® - 2" PVC Schedule 40 with DWV fittings or equivalent.

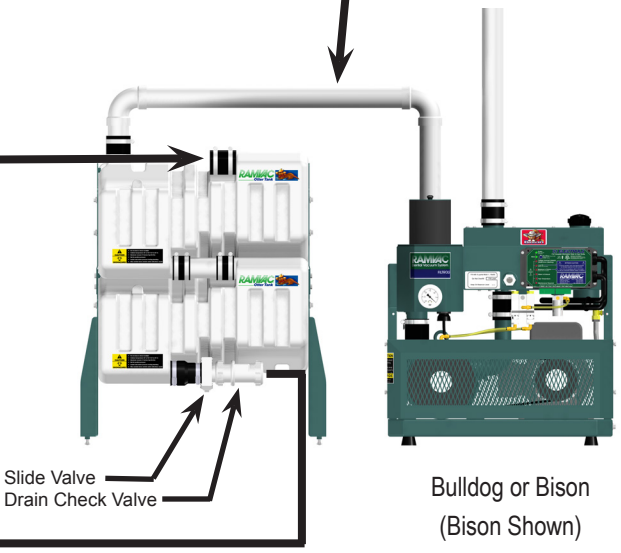
Use new, clean pipe to connect tank to Vacuum Power Unit.

Do *NOT reuse old or exsisting pipe.*



Drain Line Options
NFPA 99c Edition





Bulldog or Bison
(Bison Shown)

Waste Pipe

Tank Drain Line

- Waste Pipe, Slide Valve, and Drain Check Valve
  - 1-1/2" PVC Schedule 40 with DWV fittings.
  - Min. slope ¼" per 10 ft (2 mm per 1m).
  - Use only RAMVAC supplied 1 1/2" drain check valve.
- Trap and Drain Branch
  - Trap and branch line 2 sizes larger than waste pipe.
  - Trap seal minimum 4" deep.
- Vents
  - Trap vent size no less than half the trap and drain branch size.
  - Vents no smaller than drain check valve.
  - Vents must extend minimum of 6" above tank top before turning horizontal.
- Follow NFPA 99c Edition, RAMVAC Instructions, and local codes.

Multiple Tank Setup Guide is packed with Tanks

Exhaust Plumbing

BIOHAZARD

Breathing Dental Vacuum System Exhaust May Be Harmful.
Exhaust to Outside of Building.
Follow NFPA 99c, RAMVAC Instructions, and local requirements.

Minimum Exhaust Length = 15 feet

from RAMVAC pump to outside end.

Contact RAMVAC for shorter distances.

Outside End
(Installer supplied)

Turn outside end down toward ground and screen to prevent entry of water, debris, and creatures.
Locate inconspicuously for sight and sound. Locate to prevent exhaust from entering building.



Run Dedicated Exhaust Lines for each RAMVAC unit installed:
DO NOT connect to plumbing vents.

Size: 2”

Type: Bulldog QT - PVC Sch 40, Sch 80, CPVC, or metal **(NOT tar coated)**.
Bulldog QT with vacuum set stronger than 9” Hg, use Bison type.
Bison® - Sch 80, CPVC, or metal **(NOT tar coated)**.
(Option: PVC Sch 40 or equivalent after first 10 feet of run).



Support Loosely:
DO NOT allow piping to touch ductwork.
DO NOT make solid attachment to building structure.

Seal: All joints must be oil tight.

Slope: All horizontal lines toward the vacuum unit, a standard plumbing slope.

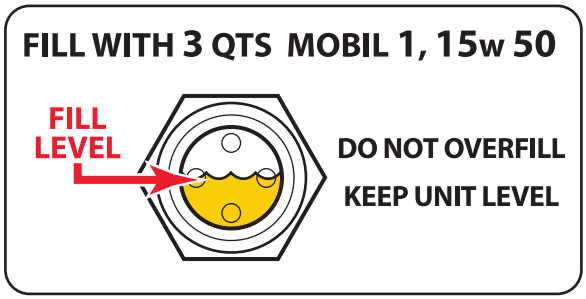
Rubber Roofs: Terminating an exhaust run over a rubber roof is not a recommended practice.
If exhaust termination above a rubber roof is necessary, protect the roof from contact with the exhaust oil vapor or droplets.

1. Terminate exhaust pipe a sufficient distance from rubber roof, or
2. Cover the rubber roof surface with material not sensitive to oil, and
3. Install a RAMVAC S-Type Exhaust filter.

Add Oil

BULLDOG

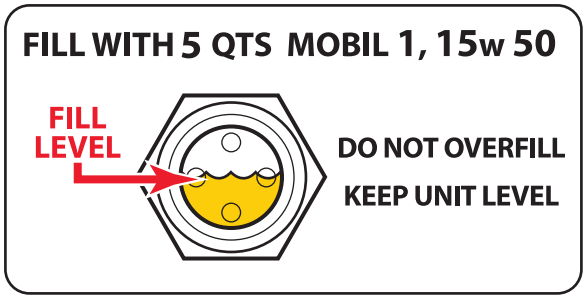
- Remove oil filler cap.
- Add 3 quarts Mobil 1, 15w50. Check *Oil Fill Level* at sightglass and add or drain oil accordingly. (see image below).
- Use only recommended oil, available locally and also available from RAMVAC.
- Securely install oil fill cap.
- Check oil drip rate. See “Check Oil Drip Rate”
- Dispose of used oil at a gas station or lubricant recycling station.



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.

BISON

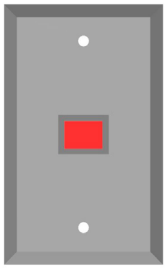
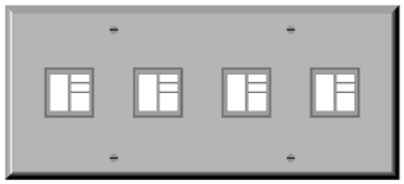
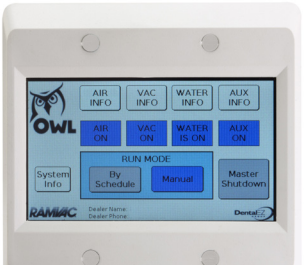
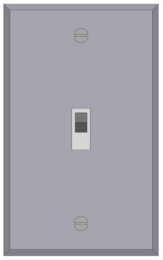
- Remove oil filler cap.
- Add 5 quarts Mobil 1, 15w50. Check *Oil Fill Level* at sightglass and add or drain oil accordingly. (see image below).
- Use only recommended oil, available locally and also available from RAMVAC.
- Securely install oil fill cap.
- Check oil drip rate. See “Check Oil Drip Rate”
- Dispose of used oil at a gas station or lubricant recycling station.



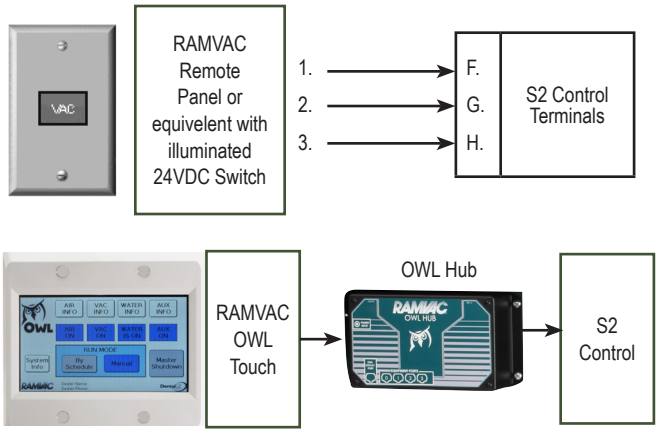
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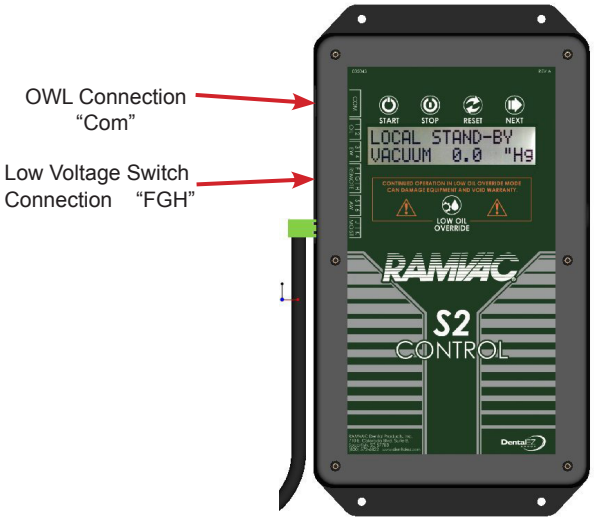
Remote Switching Options

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!

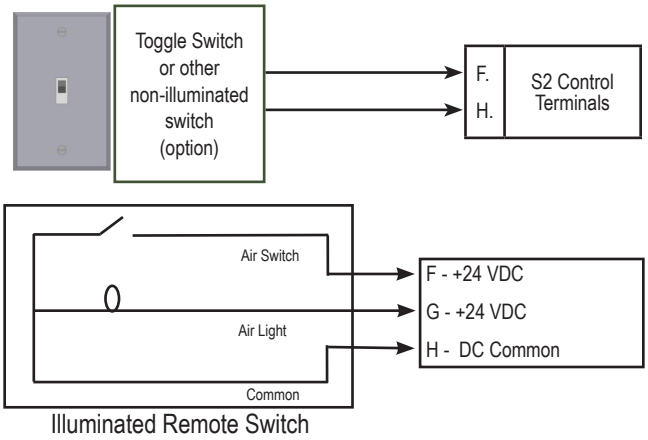
Illuminated Remote Panel	RAMVAC® OWL™ Touch	Non-Illuminated remote Switches
 		
• Switch light is steady-on when system is running normally. • Switch light flashes for maintenance or one of the heads has been disabled by the disable button on the C2 Control.	• Touch Pad illuminates while equipment is 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.

Electrical Ratings

WARNING

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

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]
Bison 3, 5, 7 60 Hz	3.0 (2.2)	1	230v	16.0 A	10 ga.	10 ga.	20 amp	FRN 25
		3	230v	8.4 A	12 ga.	12 ga.	15 amp	FRN 12
			460v	4.2 A	12 ga.	12 ga.	15 amp	FRS 5
Bison 9 60 Hz	5.0 (3.7)	3	230v	13.2 A	12 ga.	12 ga.	20 amp	FRN 25
			460v	6.6 A	12 ga.	12 ga.	15 amp	FRS 10
Bulldog QT 1, 2 60 Hz	1.0 (0.7)	1	115v	9 A	12 ga.	10 ga.	20 amp	FRN 25
			230v	4.5 A	12 ga.	12 ga.	15 amp	FRN 8

50 Hz Models

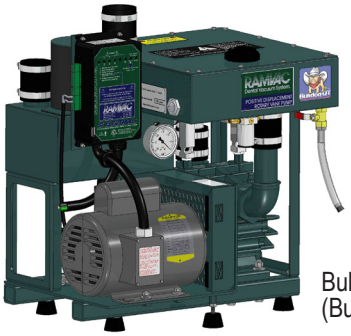
MODEL	MOTOR				THHN Wire Size[1]		PROTECTION[2,3]
	Hp (kW)	Phase	Voltage[4]	Max Amps	50 ft.	100 ft.	Breaker[2]
Bison 3, 5, 7 50 Hz	3.0 (2.2)	1	220v	16.0 A	10 ga.	10 ga.	20 amp
	5.0 (3.7)	3	220v	14.4 A	12 ga.	12 ga.	15 amp
			380v	8.3 A	12 ga.	12 ga.	15 amp
			440v	7.2 A	12 ga.	12 ga.	15 amp
Bison 9 50 Hz	5.0 (3.7)	3	220v	14.4 A	12 ga.	12 ga.	20 amp
			440v	7.2 A	12 ga.	12 ga.	15 amp
Bulldog QT 1, 2 50 Hz	1.5 (1.1)	1	110v	19 A	12 ga.	10 ga.	20 amp
			220v	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. See NEMA guidelines for applicable voltage and frequency range.

Single Phase Installation

For three phase power, see “Three Phase Startup”.

RAMVAC Supplied Equipment	Owner / Contractor Supplied Equipment
 6 ft. conduit and wires (connects to Disconnect) Bulldog or Bison (Bulldog shown)	Disconnect  Power Panel (dedicated breakers) 

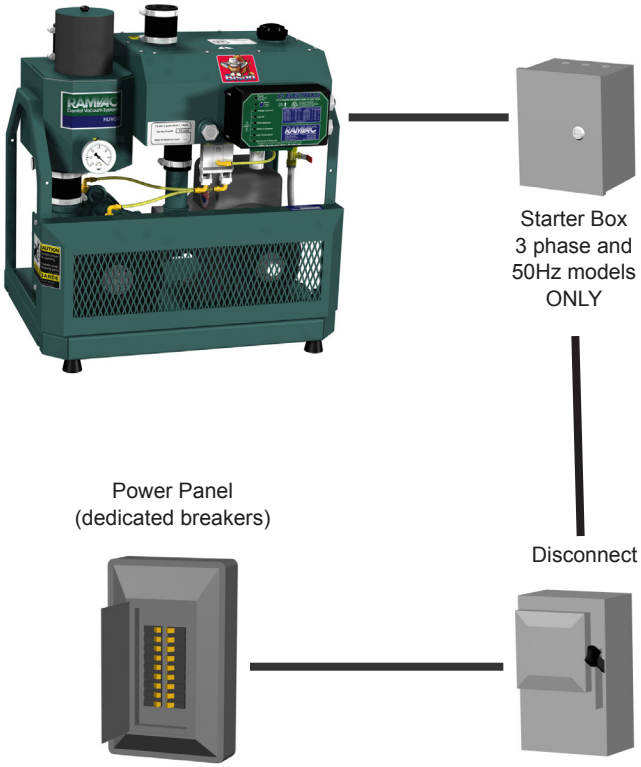
Three Phase Vacuum Power Unit Startup

To verify proper pump rotation, use this procedure when starting a three phase vacuum unit for the first time.
CAUTION: Continuous improper rotation can permanently damage pump.

1. Lift Vacuum Controller up and out of Filtrols. (See Illustration)
2. Remove Main Air Filter from inside Filtrols. (See Illustration)
3. Check for correct rotation:
   a. Place hand in Filtrols close to pump inlet pipe.
   b. Run Power Unit just long enough to feel if inlet pipe is blowing or sucking air; then turn the Power Unit off.
4. If air blows out of inlet pipe:
   a. Reverse any two motor leads on starter. (See bottom right illustration).
   b. Repeat step 3.
5. If air sucks into inlet pipe:
   a. Clean any oil or debris out of Filtrols.
   b. Reinstall Main Air Filter.
   c. Reinstall Vacuum Controller.

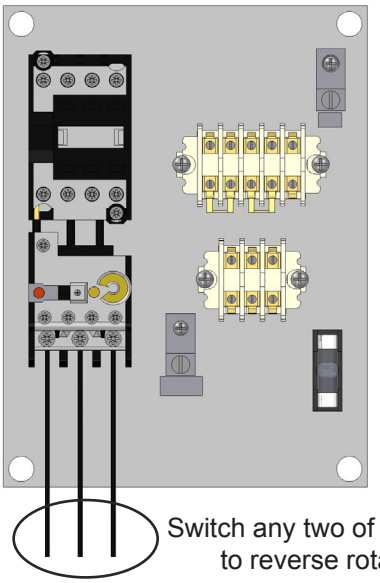


Three Phase Startup



Notes:

Contents inside motor starters will vary.
For simplicity, not all starter box wiring is shown.



Switch any two of these wires to reverse rotation.

INSTALLATION CHECKLIST

Print or Type

Dentist or Institution Name: _____

Dental Facility Name: _____

Mailing Address: _____

_____

(City) (State) (Zip)

Phone: ( ) _____ - _____

Facility person responsible for RAMVAC maintenance: _____

Installation Date: _____

Email: _____

Complete by Installer

Vacuum Unit **Model** No. 8 E. . .

Tank **Model** No. 5

Vacuum Unit **Serial** No.

Tank **Serial** No.

Vacuum Plumbing

____ Number of Treatment Rooms / Chairs

____ Number of Vacuum Sinks

____ Number of Vacuum Cuspidors

Piping Layout

[ ] Overhead Lift Height _____ (Floor to Trunk Line)

[ ] Below Grade

[ ] Pipe Size (T[illegible]) _____

[ ] Other _____

Tank Drain

[ ] Air G[illegible]

[ ] No A[illegible], Vented per NF[illegible]99

Exhaust Plumbing

Y N Dedicated exhaust p[illegible] outside [illegible]

Y N Exhaust pipes joints sealed

Y N Exhaust piping loosely supported to isolate vibration

Y N Outside end capped or turned down to prevent entry of rain or snow

Y N Outside end screened to prevent entry of animals

Exhaust Pipe Material

[ ] PVC Sch 40

[ ] PVC Sch 80

[ ] Copper

[ ] Other _____

Electrical

_____ Breaker/Disconnect Amp Rating

_____ Line Voltage

_____ Running Voltage

_____ Amps Lead 1 (all motors)

_____ Amps Lead 2 (all motors)

_____ Amps Lead 3 (3ph motors)

Pump Lubrication

[ ] Machine is installed level

[ ] OK

Drip Rate

_____ s/min - [illegible]ght D[illegible]er (All systems)

_____ s/min - [illegible] D[illegible]er (All systems)

_____ s/min - [illegible]ripper (Bison 7 & 9)

Switching

What on-off switching m[illegible]od will be used?

[ ] Switch on S2 B[illegible]

[ ] Remote Switch

[ ] RAMVAC Remote Control Panel

[ ] RAMVAC Illuminated Switch

[ ] Non-RAMVAC Illuminated Switch

Copy

Seperate Document

(Shipped with Power Unit)

I have demonstrated and explained Operation and Maintenance procedures, using the User Guide and hardware, to the facility person responsible for RAMVAC maintenance:

_____ _____

(Printed Name of Installer) (Dealer)

Free Gift Certificate for Installers! Just complete information on back of white copy.

Complete by Owner

Warranty Initialization

- I have a User Guide and I will comply with the operation and maintenance instructions or contact RAMVAC if I cannot.
- I have a completed copy of the RAMVAC Installation Checklist.
- I understand that RAMVAC warranty coverage depends on RAMVAC Corporation's receipt of this document.

_____ _____

(Printed Name of Owner or Authorized Agent) (Signature of Owner or Authorized Agent)



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www.dentalez.com

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