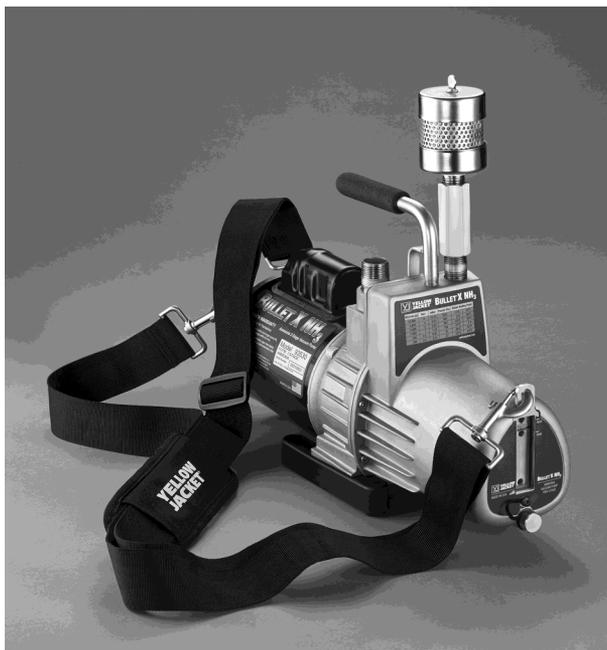




BULLET[®]X NH₃ Vacuum Pump

for Ammonia and NH₃ Systems



Operation and Maintenance Manual

Models: 93530, 93533, 93539

English.....pages	1-9
Español.....páginas	10-18
Français.....pages	19-27
Deutsch.....Seiten	28-36



PN 142884 Rev.E 8/20

Table of Contents

	Page
How to obtain service.....	2
Features of your new pump.....	3
Warranty Information.....	3
The purpose of the BULLET [®] X NH ₃ design.....	4
The 7 important steps of initial start-up.....	4
Oil changes.....	5
Vacuum tips for best performance.....	5
Dual voltage motor power conversion (if applicable).....	5
Basic troubleshooting.....	6
Diagnostic chart.....	7, 8
Replacement parts.....	9

Important Notices to Purchaser

Check for damage immediately.

All YELLOW JACKET[®] BULLET[®]X NH₃ vacuum pumps for ammonia and NH₃ systems are completely tested and inspected to assure compliance with Ritchie factory specifications prior to shipment.

If the pump carton is damaged, check contents immediately. Note damage on shipper's Bill of Lading and have shipper sign your statement. Notify the carrier immediately of the damage to arrange inspection of the pump and packaging.

The CARRIER ALONE is responsible for handling and settling your claim. Ritchie Engineering will cooperate in assessing damage if the pump is re-

turned to the factory prepaid.

Carton contents include:

- BULLET[®]X NH₃ Vacuum Pump for Ammonia and NH₃ Systems.
- Bottle of YELLOW JACKET[®] SuperEvac[™] Pump Oil
- Owner's manual

How to Obtain Service

Most returned pumps are merely in need of normal field service maintenance, such as changing oil or making minor adjustments. In many instances, the troubleshooting information in this manual can save you the time and effort of returning your pump. When the information contained in this manual, however, does not solve the problem, please call for service.

In the U.S. call the Ritchie Engineering Customer Service Department:

Phone: (952) 943-1333 or (800) 769-8370
Fax: (952) 943-1605 or (800) 322-8684
E-mail: custserv@yellowjacket.com

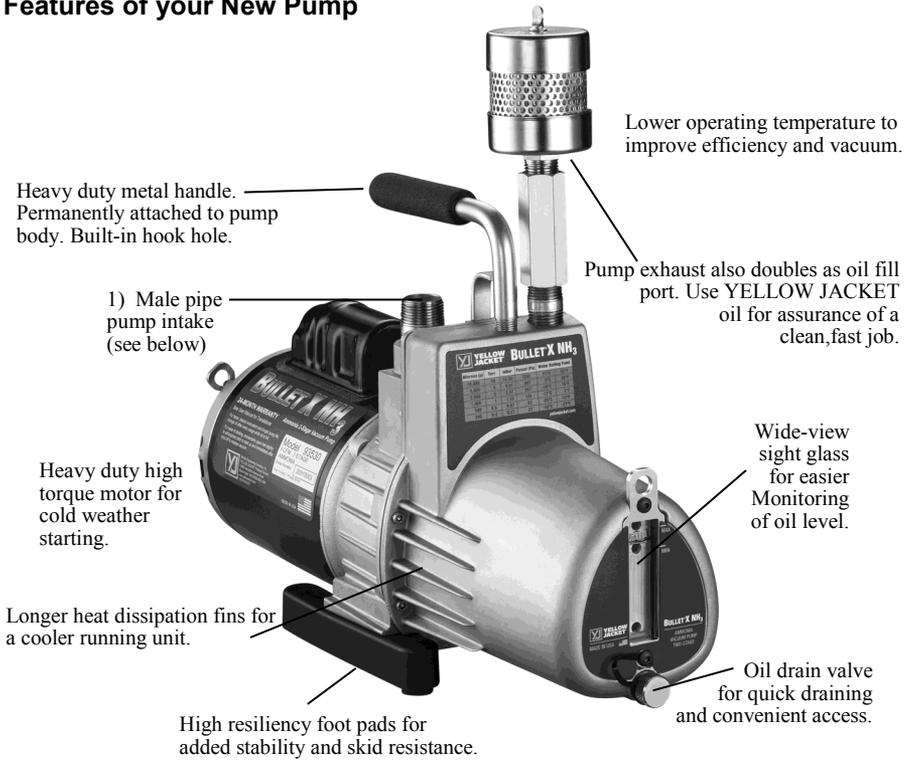
A representative will help to determine if the problem can be solved without sending your pump to the factory and taking it out of service.

Returns: If the pump does need to be returned to the factory, and you are in the U.S., **DRAIN THE OIL** and send the pump - freight prepaid - to:

Ritchie Engineering Company, Inc.
Customer Service Department
10950 Hampshire Avenue South
Bloomington, MN 55438-2623 USA

If you are in a country other than the U.S., please contact the wholesaler from whom the pump was purchased.

Features of your New Pump



Male pipe pump intake. Large hose suggested for maximum pull down.

WARRANTY INFORMATION

Ritchie Engineering guarantees YELLOW JACKET® products to be free of defective material and workmanship which could affect the life of the product when used for the purpose for which it was designed. This warranty does not cover items that have been altered, abused or returned solely in need of field service maintenance.

If found defective, we will either replace or repair

at our option products within two years of proof of purchase. Warranty does not cover items that have been altered, abused (including failure to use the correct type of vacuum pump oil) or returned solely in need of field service maintenance. **Returns must be pre-paid.**

Warranty does not cover use on lithium bromide systems.

The Purpose of the BULLET®X NH₃ Design

The BULLET®X NH₃ Pump is a 2-stage rotary vane design (at right) that increases efficiency and speeds pump down to 25 microns.

The pump lowers the internal pressure of a refrigeration system until moisture boils into a vapor. As the moisture is vaporized, it is evacuated by the pump, helping dehydrate the system. Most technicians try to achieve between 250 and 1000 microns.

A manometer or electronic vacuum gauge are the only ways to monitor evacuation progress. Manometer readings are approximate in inches of mercury. Only an electronic vacuum gauge is accurate enough to show when you reach the desired micron range.

As the chart shows, only an electronic gauge reads fine differences to provide assurance that the vacuum is low enough to boil the greatest possible amount of moisture.

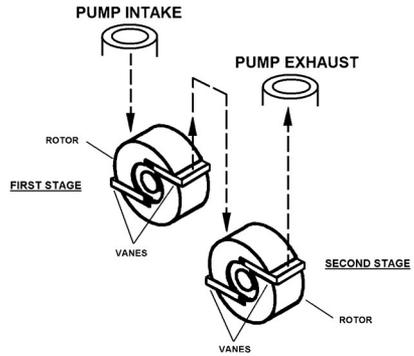
How one small drop dampens your profits.

A small drop of moisture can hurt your profits and reputation.

Boiling temp of water	Inches mercury	Microns
212°F (100°C)	0	760,000
151°F (66°C)	22.05	200,000
101°F (38°C)	27.95	50,000
78°F (26°C)	28.95	25,000
35°F (2°C)	29.72	5,000
1°F (17°C)	29.882	1,000
- 50°F (-46°C)	29.919	50

During new system set-up, protective caps are removed admitting moisture and air into system components.

If air – a non-condensable – remains in the system, it collects on the high side reducing system efficiency. This causes a rise in head pressure. The dis-



First stage exhausts into the intake of the second stage similar to two single stage pumps connected together.

charge valve gets hotter than normal and organic solids form causing compressor failure.

Moisture in the system can form ice which closes off openings in expansion valves and cap tubes, and prevent adequate cooling.

Ultimately moisture and air can produce acids and sludge which could cause in-warranty failures.

During service and parts replacement, the same contaminants get in again, and you could be called back for repairs by a dissatisfied customer.

Moisture and air can even enter through system leaks. And as the moisture in the air increases, so does the amount of contamination. The higher the humidity, the bigger your problem.

A vacuum pump "pulls" air and moisture out of the system before the system is damaged. The higher and more complete the vacuum, the more moisture is removed. That's why your BULLET®X NH₃ pump is specifically engineered for high vacuums of 25 microns and better.

The 7 Important Steps of Initial Start-Up

- 1) Make sure motor is off and name plate voltage on motor bottom matches outlet voltage.
- 2) Remove exhaust filter. Fill with YELLOW JACKET SuperEvac Pump Oil until oil level is even with oil level line. Replace exhaust filter.
- 3) With the intake port open, switch on the motor. When pump reaches running speed, connect the pump to the system.
- 4) To check the pump's performance, attach a micron gauge to the intake port, making sure that the gas ballast valve is closed. Turn on the pump. The micron gauge will display the ultimate vacuum reached.
- 5) Improve cold weather starting by opening intake and running your pump for 10-15 seconds.
- 6) Before turning pump off, break vacuum to atmosphere.

- Disconnect pump and cover the intake to keep out contaminants.

If an extension cord is needed, refer to the chart for proper sizing:

RECOMMENDED EXTENSION CORD SIZES

Total Extension Cord Length (Feet)		
25'	50'	100'
16 Ga.	14 Ga.	12 Ga.
Wire Gauge (AWG)		

Oil Changes

CHANGE OIL AFTER EACH USE to protect pump components from contaminants pulled into pump during service. Place used oil in a sealable container and dispose properly in accordance with local regulations.

YELLOW JACKET vacuum pump oil is specially refined and formulated for extremely low vapor pressure and high pump efficiency at all temperature conditions. This means it can help you get a **continued return on your pump investment.**

Vacuum Tips for Best Performance

- For the fastest vacuum, connect your pump **directly** to the system. Going through a manifold slows the job.
- Use as **large** a hose as possible, even though the system has 1/4" fittings. A 1/2" or 3/8" hose allows a much faster and more complete vacuum.
- Use as **short** a hose as practical to get maximum evacuation speed. Short hoses make evacuation faster than longer hoses. Long hoses slow the process.
- Metal hoses** are the most impervious so will be most effective in evacuation.
- Evacuate through **both high and low** sides at the same time to speed evacuation.
- Use **two pumps** on very large systems to reduce vacuum time.
- Do not use hoses with brass fittings on ammonia systems. Brass and copper are chemically incompatible with ammonia and will corrode on contact.

Dual Voltage Motor Power Conversion (if applicable)

STEP 1

Disconnect the motor from the power supply and remove. Remove the yellow "CAUTION" sticker from the back of the motor.



STEP 2

Pull up on the white plastic "arrow" switch using needle-nosed pliers until the switch is loose inside the motor housing (it will not come completely out of the motor).



Note: Do not try to turn or rotate the switch until it has been pulled up and is loose.

STEP 3

Point the arrow toward the desired voltage setting and push the switch back down into the motor. The arrow on the switch should be sub-flush of the motor housing when correctly installed at the desired voltage.

HI = 230 VAC / 50 Hz
LO = 115 VAC / 60 Hz



STEP 4

Replace the yellow "CAUTION" sticker over the voltage selector switch.

Ensure that the voltage setting corresponds with the power supply that the motor is plugged into.



***Warranty is void if the set vacuum pump voltage does not match the power supply. Dual voltage motors are factory set to 230V/50Hz.**

Basic Troubleshooting

4 most common comments on pump return paperwork:

- 1) **"Will not pump."** This usually means the pump will not pull a deep enough vacuum. This can be caused by contaminated oil.

SUGGESTION: Change gas ballast o-ring, change oil twice and recheck vacuum.

- 2) **"Will not pull below 1000 microns."**

SUGGESTION: Test pump to determine actual pull down. Remove all hoses and connect vacuum sensor directly to pump.

- 3) **"Noisy."** Pumps are noisy when they have not achieved a high vacuum. In intermediate vacuum, there will be oil, vane and exhaust noises.

SUGGESTION: Listen to the pump at high vacuum. If relatively quiet, the pump is running properly. If still noisy, there may be a system leak or low pump oil.

- 4) **"Repair and return."** This is the most difficult return comment to handle, since we are unsure of what needs to be done to keep the customer satisfied.

SUGGESTION: Be specific about the problem with your pump if returning it. Please include a separate sheet of paper documenting your problem.

Starting problems

- Be sure pump is plugged into live receptacle with line voltage plus or minus 10% of voltage on motor nameplate. Long extension cords can greatly reduce voltage and cause problems.
- Pump/oil temperature must be 30°F (-1°C) or higher. Open intake to atmosphere and switch

on pump; run up to speed before connecting to system.

- Your SuperEvac pump features a heavy-duty high torque motor for cold weather starting, but dirty oil makes starting more difficult, causing unnecessary wear on your unit.
- Dropping your pump can damage it. In a locked pump condition, motor will not run and the thermal overload will kick out.
- Disconnect power cord and set pump with front cover face down on table. Reach into coupling area and try to rotate the coupling. Do not use pliers. If the pump does not rotate, it is "locked up."

Oil leakage

- If leak develops between front and rear half of oil case, tighten all screws. Replace gasket if necessary.
- If shaft seal leaks, replace it.
- Wipe pump dry and watch for source of leak. Tighten screws and repair.

The steps to solving 95% of all problems

- 1) **Check oil level when pump is running.** It should be at or above the indicated levels...the level necessary for proper operation.
- 2) **Check all connections.** Make sure they are tight. Put vacuum pump oil on gas ballast "O"-ring.

Diagnostics Chart

Condition	Pump Area	Possible Problem	Solution
Poor vacuum	Quiet pump	Dirty oil	Flush 1 to 3 times
		Coupling or set screw loose	Repair or replace
		Bad exhaust valve	Repair or replace
		Pump not oiling	Call factory
		Vanes not functioning	Call factory
		Stator misaligned	Call factory
		Worn pump bearings	Call factory
	Ultimate vacuum of pump - does not meet mfg. spec (read with thermocouple)	Pump dropped	Call factory
		Bad thermocouple	Clean or replace
		Bad motor	Repair or replace
		Dirty oil	Flush 1 to 3 times
		Air leaks	Repair or replace
		System leaks	Isolate/repair
		Fitting sealant compound	Repair or replace
	Noisy pump	System leaks	Repair leaks
		Low oil level	Add/replace
		Dirty oil	Flush 1 to 3 times
		Worn pump	Replace module, call factory
Air leaks at fittings or gasket seals		Replace/repair	
Oil Leaks	Exhaust	Oil level high	Adjust oil level
		System vented pressure through pump	Check oil level, add or replace oil
		Pump tipped over	Check oil level, add or replace oil
	Seal	Pump shaft	Repair
		Worn or damaged seal	Replace
		Motor loose	Adjust/tighten, check seal
	Case	Gasket bolts loose	Tighten
		Oil drain fitting	Repair or replace
		Gasket damaged	Replace
Pump won't start	Motor stalled hot/cold	Damaged motor	Repair or replace
		Damaged pump	Replace/call factory
	Thermal	Low voltage	Shorter extension cord
		Cold weather cut-out	Open intake fitting for 3 minutes to warm up while starting
		Dirty oil	Flush 1 to 3 times

Condition	Pump Area	Possible Problem	Solution
Unusually noisy	Motor	Worn motor	Replace motor
		Loose motor bolts	Tighten bolts
		Coupling drive	Adjust/replace coupling
		No end play on shaft	Adjust coupling
	Pump	Dirt, low, improper oil	Flush and replace oil
		Air leaks:	
		1) Caps/connection	Tighten
		2) Fittings	Replace/reseal
		Damaged or worn bearing	Call factory
Damaged or worn stators		Call factory	
Pump out of adjustment	Call factory		
High temp	Motor	Low voltage	Short extension cord
	Pump	Dirty oil	Flush and replace
		Low oil	Add/replace
		Lint/foreign material	Open gas ballast
		Parts friction	Replace oil/call factory
		Too small for system	Size pump for system
		Air leaks	Replace/repair

WARNING

- This unit generates a deep vacuum that can be harmful to human tissue. Do not expose any part of the human body to the vacuum.
- Do not operate this unit with the exhaust blocked or restricted.
- Keep unit a minimum of 4” (10 cm) from objects for adequate cooling of motor.
- Continuous sound pressure level of this unit can exceed 70dB (A).
- Vacuum pump exhaust may contain harmful vapors. Provide adequate ventilation.
- This unit is not rated for use with high pressure fluids. Misuse on pressurized systems could cause injury or death.

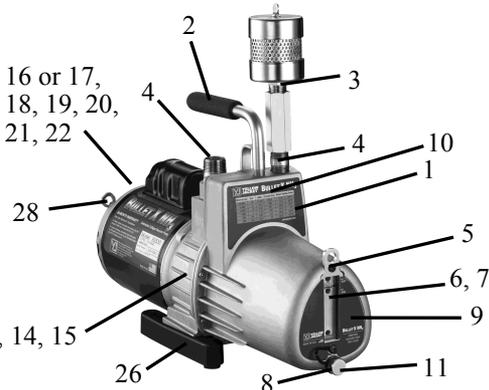
Replacement Parts Models 93530, 93533, 93539 - 8 CFM (190 L/M)

Pump Oil Cover	
1. Complete cover (individual parts listed below)	92966
2. Handle with screw	92941
3. Exhaust filter assembly	93386
4. Oil fill/intake fitting	93359
5. Pair of Sight Glass Screws	92933
6. Sight Glass Bezel	92934
7. Sight Glass and Gasket	92935
8. Tether	92932
9. Cover Label	92967
10. Cover Gauge Label	92968
11. Oil Drain Plug	92956
Vacuum cartridge	
12. Complete cartridge with oil cover gasket	92957
Mounting body	
13. Complete body (individual parts listed below)	92969
14. Shaft seal	93354
15. "O"-ring for gas ballast	93398

Motor	
16. 1/2 hp - 230V/50 Hz* (includes items 18 and 19)	1/2 hp 93513
17. 1/2 hp - 115V/60 Hz* (includes items 18, 19 and 20)	1/2 hp 93505
18. 8/32 x 7-1/4" motor bolts (4)	93099
19. Rocker style switch	93117
20. 8' long cord	93115
21. 8' long EU cord (detachable IEC-320)	95431
22. 8' long UK cord (detachable IEC-320)	95432
Final assembly parts	
23. 8/32 x 5/8" socket head screws	93506
24. Oil cover gasket	92942
25. Drive coupling	93047
26. Right or left leg assembly with screws	92959
27. Cartridge Baffle	92940
28. Shoulder Strap Mount	92943
29. Rope loop with screw and washer	92970

Model	Voltage	Fre- quency	Cur- rent	Weight
93530	115V	60 Hz	7A	30.8 lbs. (14.0 kg)
93533	230V*	50 Hz*	4A	32.5 lbs. (14.7 kg)

*The 93533 is factory wired for 230V. It can also be configured for 115Vac. Remove the motor switch plate and make connections as shown on the motor label.



Damaged cords must be replaced by special assemblies available from the manufacturer or its distributors.



Ritchie Engineering Co., Inc.
 YELLOW JACKET Products Div.
 10950 Hampshire Ave., S.
 Bloomington, MN 55438-2623
 USA

Phone: 800-769-8370
 Int'l Phone: 952-943-1333
 Fax: 800-322-8684
 Int'l Fax: 952-943-1605

e-mail: custserv@yellowjacket.com
 Website: www.yellowjacket.com