SERVICEFIRST™

Installation
Operation
Maintenance

NanoVac

High Pressure Residential and Light Commercial Oil-less Refrigerant Recovery Unit

Model Numbers: RRHA

RRHA-SVX01A-EN

Table of Contents

General Information

Warnings and Cautions

Warnings and Cautions appear at appropriate locations throughout this manual. Read these carefully.

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may be used to alert against unsafe practices and where property-damage-only accidents could occur.

Model Number Description

R	R	H	A	1	1	1	A	0	A	0
1	2	3	4	5	6	7	8	9	10	11

Refrigerant Recovery

Digits 1, 2 - Product Description
RR = Refrigerant Recovery

Digit 3 - Model Identifier
A = MicroVac
B = HandiVac
C = MityVac
D = EVAC Commercial
E = EVAC Industrial
F = LoVac
G = AllVac
H = NanoVac

Digit 4 - Development Sequence
A = First Development

Digit 5 - Condenser Type
1 = Air Cooled
2 = Water Cooled
3 = Air/Water Cooled

Digit 6 - Control Type
1 = Electromechanical
2 = Microprocessor

Digit 7 - Connection Type
1 = 1/4” flare
2 = 1/2” flare
3 = 3/4” flare
4 = 1.25” pipe thread fitting w/ball valve
5 = Quick Connects on unit and hoses

Digit 8 - Unit Voltage (voltage/hz/phase)
A = 115/60/1, 110/50/1
B = 230/60/1, 220/50/1
C = 460/60/3, 415/50/3
D = 575/60/3, 220/50/3
E = 230/60/3, 220/50/3
F = 575/60/3
G = 230-460/60/1, 220-415/50/1
H = 460-575/60/3, 415-550/50/3

Digit 9 - Safety Features
0 = Open
1 = Float Cable Connection
2 = Low Pressure Shut-Off
3 = Float cable connection, LP shut-off

Digits 10, 11 - Design Sequence
A0 = First Design Sequence

Literature History

RRHA-SVX01A-EN (July 2001)

Original issue of manual. Describes the Installation, Operation and Maintenance procedures for this unit.

General Information

Electrical Power Requirements

Recovery Main Components & Controls:

- 110-115 VAC, 50/60 Hz, 1-Phase, 12-Amperes MIN CKT AMP 12.0, MAX FUSE 15 AMPS
- 220-240, 50/60Hz, Min. 5 AMPS, Max 10 AMPS

Dimensions (approximate)

11” high x 8” wide x 12” deep

Weight

27-lbs. (31-lbs. shipping)

Optional Accessories

- 30-lb. Recovery Tank
- 50-lb. Recovery Tank
- 6’ x 1/4” Red & Blue Recovery Hoses
- Shoulder Strap
- 1/4” FL Tee
- Sight Glass

Notice

The Trane Company urges that all HVAC servicers working on Trane equipment, or any manufacturer’s products, make every effort to eliminate, if possible, or vigorously reduce the emission of CFC, HCFC and HFC refrigerants to the atmosphere resulting from installation, operation, routine maintenance, or major service on this equipment. Always act in a responsible manner to conserve refrigerants for continued use even when acceptable alternatives are available. Conservation and emission-reduction can be accomplished by following recom- mended Trane service and safety procedures published in Trane General Service Bulletin CTV-SB-81. The information and procedures provided in CTV-SB-81 supersedes those published in this manual. Copies of this bulletin may be obtained by contacting your local Trane commercial representative.

WARNING!

To avoid injury or death due to inhalation of, or skin exposure to refrigerant, closely follow all safety procedures described in the Material Safety Data Sheet for the refrigerant and to all labels on refrigerant containers. Certain procedures common to refrigeration system service may expose personnel to liquid or vaporous refrigerant.

General Information

Notice:

NanoVac Refrigerant Recovery Unit for use with refrigerants: R-12, R-134a, R-500, R-502, R-22, 410a

⚠ WARNING

EPA requires that only HVAC service technicians certified to work with refrigerants and recovery units should operate this equipment.

This equipment has been certified by an independent testing organization to meet EPA minimum requirements for recovery equipment.

Always wear proper clothing and eye protection while operating this machine.

Do not overfill refrigerant tanks. full weight is 80% in liquid volume. Use certified tanks only meeting D.O.T. specs 4BA or 4BW. (30 Lb. cyl full at 24 Lb., 50 Lb. cyl full at 40 Lb.) Do not operate recovery unit or tanks above 125 F max.

⚠ WARNING

To reduce the risk of fire do not use an extension cord over 25 feet in length with a minimum gauge size of 12 AWG. Failure to do so may result in cord overheating and fire. This equipment should be used in locations with mechanical ventilation that provides at least four air changes per hour or the equipment should be located at least 18 in. (457 mm) above the floor. This equipment should not be used in the vicinity of spilled or open containers of gasoline.

Only use proper float cable and float switch specifically designed to work in conjunction with this recovery device.

General Information

Recommended Equipment & Practices for Peak Performance

NanoVac performs:

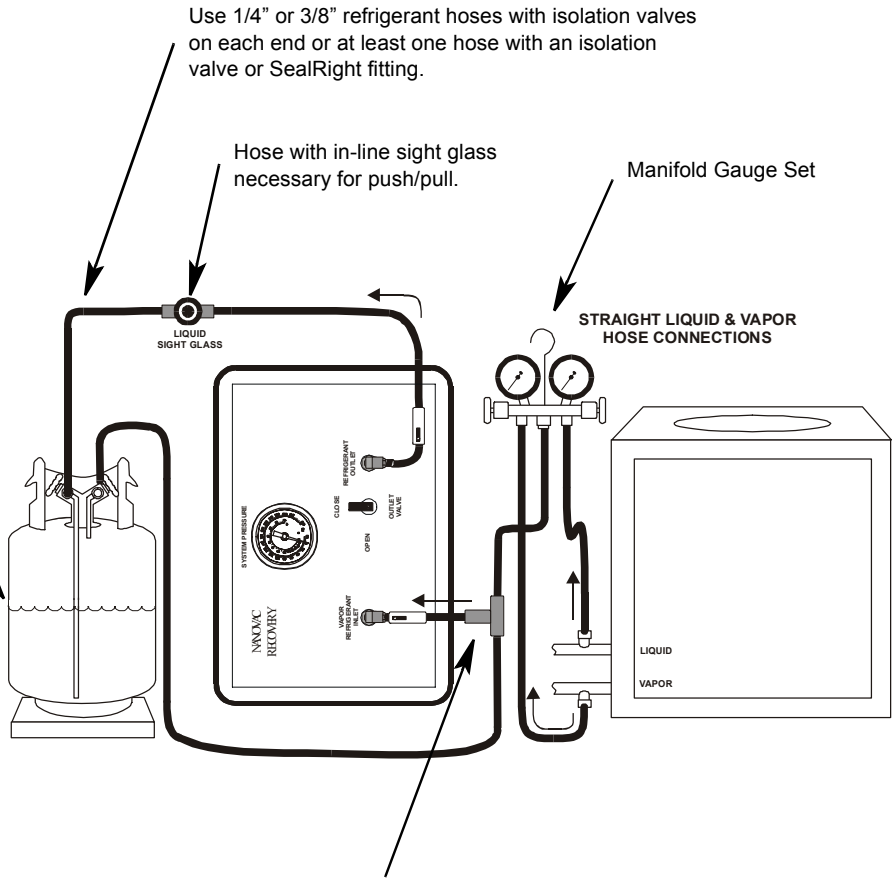
- Self evacuation prior to recovery
- Direct liquid & vapor recovery
- Push/pull recovery
- In-process tank subcooling
- Refrigerant clearing

Always connect a three wire power cord to a 1-Phase power source. Verify that power cord and power source are properly sized for load.

Use the following equipment and practices to achieve peak performance and the fastest transfer of refrigerant with your NanoVac recovery unit.

Use Recovery Tank with minimum 1/4" male flare connections on vapor and liquid ports. Tank, or series of tanks, must hold the entire recovered refrigerant charge at 80% full* and must be pressure rated for the specific refrigerant being recovered. When recovering a Class V high pressure refrigerant like R410a, always subcool the tank when its internal pressure exceeds 375-psi. Always evacuate the cylinder to 29-in Hg vacuum prior to recovery.

Use a suitable scale to weigh refrigerant charge in case NanoVac needs to shut down to prevent overfilling tanks. If a scale is not available, NanoVac is equipped with a float switch connection that deactivates the unit's control circuit when the tank is 80% full. Optional float cable and proper recovery tank are needed.



Using an additional hose with an optional inline "Tee" connection allows the operator to regulate vapor from the recovery tank to the inlet of NanoVac, thus subcooling refrigerant in the tank and alleviating head pressure. For faster subcooling, close off the manifold set to isolate the recovery tank.

***Reminder:** Refrigerant full weight is 80% of water capacity weight determined as follows: Maximum allowable gross weight = 80% of water capacity weight + cylinder tare weight. A 50-lb. recovery tank at 80% will hold 40-lbs of refrigerant. A 30-lb. recovery tank at 80% will hold 24-lbs of refrigerant.

Liquid Push/Pull

a) Turn Refrigeration or A/C System OFF & make sure it cannot restart, then plug NanoVac unit in to power source.
Note: Do not open isolation valves on hoses connected to A/C system until Step E.

b) Connect three refrigerant hoses from:
- A/C system liquid port to recovery tank liquid port. Use hose with in-line sight glass.
- Recovery tank vapor port to vapor refrigerant inlet on NanoVac.
- NanoVac refrigerant outlet to A/C system vapor port.

c) If optional float connection is installed, connect float cable from NanoVac to recovery tank.If a scale is used and NanoVac has an optional tank 80% full bypass switch, put switch in “Scale” position.

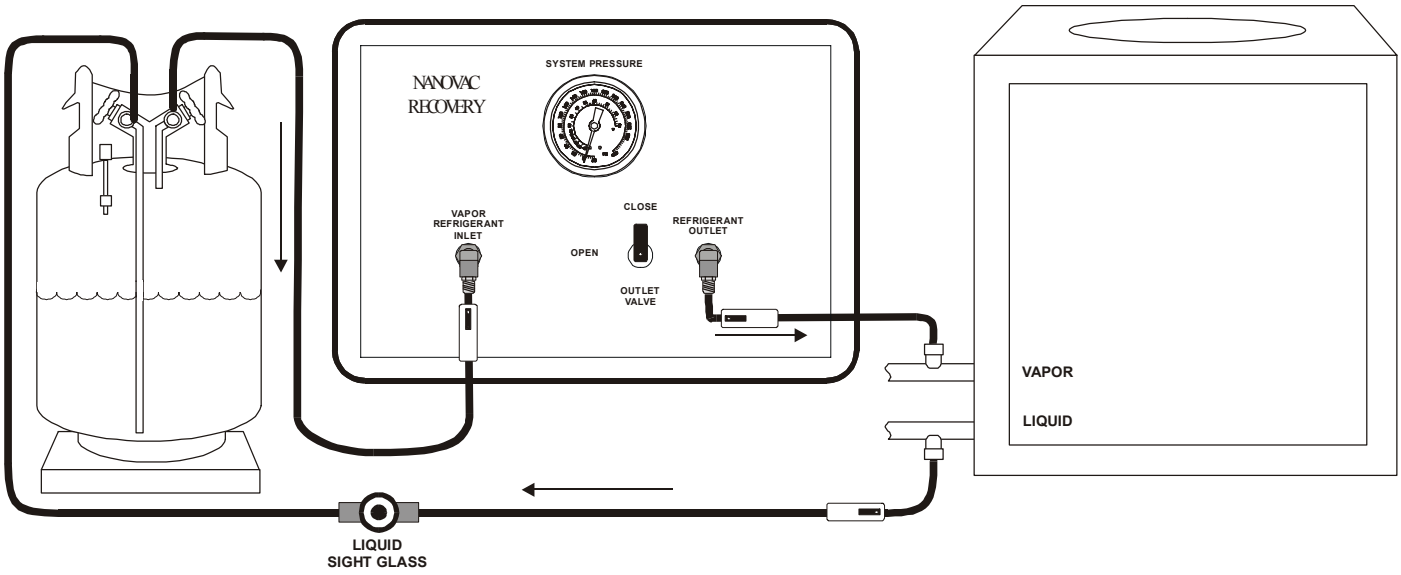
d) Hose Evacuation when recovery cylinder is empty:
- Turn outlet valve on NanoVac to Open position
- Open liquid and vapor valves on recovery tank.
- Loosen hose at NanoVac refrigerant outlet
- Turn NanoVac “On”.
- Hose from liquid port of A/C system, recovery tank and inlet hose to NanoVac is now be evacuated. Watch system pressure gauge on NanoVac when gauge reads a 10 Hg vacuum tighten refrigerant outlet hose.

e)Now open isolation valves on hoses and tanks.NanoVac draws vapor off of recovery tank & forces compressed gas back into the vapor side of A/C system. Liquid push/pull is in process.
Watch the in-line sight glass on hose between A/C system and recovery tank liquid ports.

- When liquid is no longer present, close isolation valves on A/C system liquid side and **both** recovery tank ports.
- Run unit until suction pressure indicates 10” Hg vacuum, then close A/C system vapor valve & close in-line ball valve on outlet port.
- Turn NanoVac “Off”. Proceed to Vapor Recovery Process on page 9.

Liquid Push/Pull

Figure 1 — Liquid Push/Pull Connection Diagram



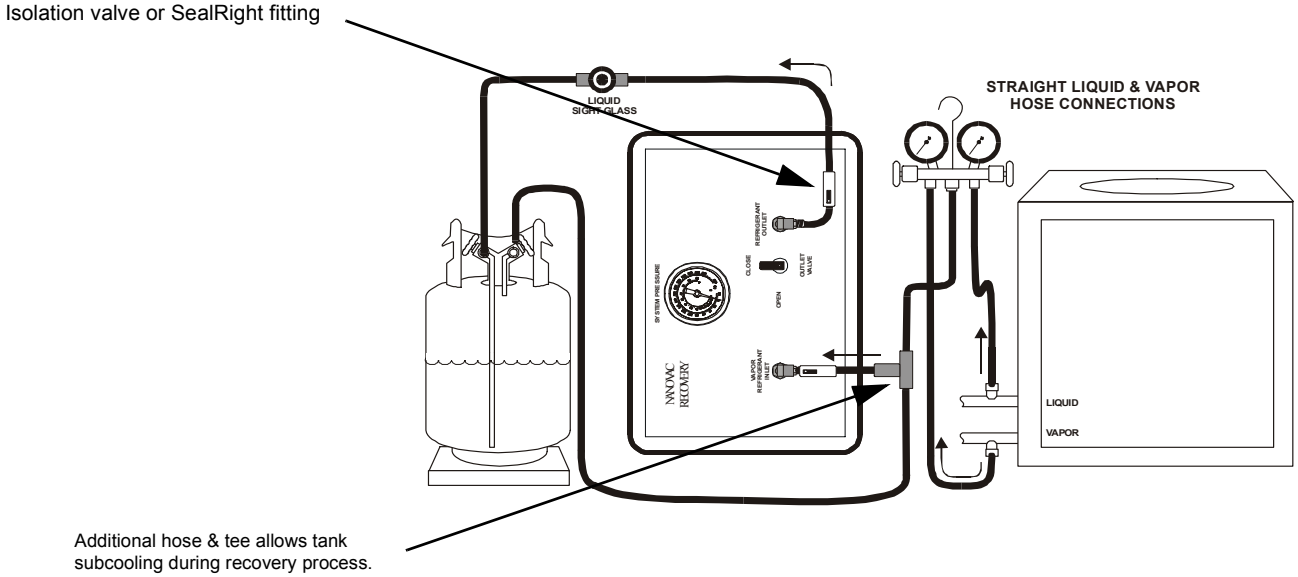
Straight Liquid or Vapor Recovery Procedure

a) Turn Refrigeration or A/C system Off & make sure it cannot restart, then plug in NanoVac unit.
b) Connect manifold set & refrigerant hoses from:
   - A/C system **high** side to manifold **high** side.
   - A/C system **low** side to manifold **low** side.
   - Manifold Set center port to NanoVac vapor refrigerant inlet
   - NanoVac refrigerant outlet to recovery tank liquid port. Use hose with isolation valve or SealRight fitting on outlet.
c) If optional float connection is installed, connect float cable from NanoVac to recovery tank.If a scale is used and NanoVac has an optional tank 80% full bypass switch, put switch in “Scale” position.
d) Self Evacuate Inlet Hoses And Recovery Unit:
   - Loosen outlet hose at recovery tank, open isolation valve and turn refrigerant outlet valve to open position.
   - Turn NanoVac “On”. When suction gauge reads a vacuum, tighten outlet hose at recovery tank, leave Outlet valve in open position then open liquid valve on recovery tank.
e) Open liquid side of manifold set slowly, regulate flow of liquid into recovery unit to prevent liquid from slugging the compressor. open until knocking occurs and then throttle back to protect the compressor.
f) After liquid has finished being recovered and liquid has been fully removed then open vapor side of manifold set fully as well as liquid side. Know regulation of vapor is necessary.
   - Turn NanoVac “Off”. Proceed to Hose Clearing And Self Evacuation on page 10.

⚠ Warning!

If extremely high liquid pressure from A/C system causes “knocking”, regulate manifold set liquid valve until knocking stops. Failure to do so may damage the oil-less compressor.

Figure 2 — Hose Connections



Hose Clearing and NanoVac Self Evacuation

⚠ Warning!

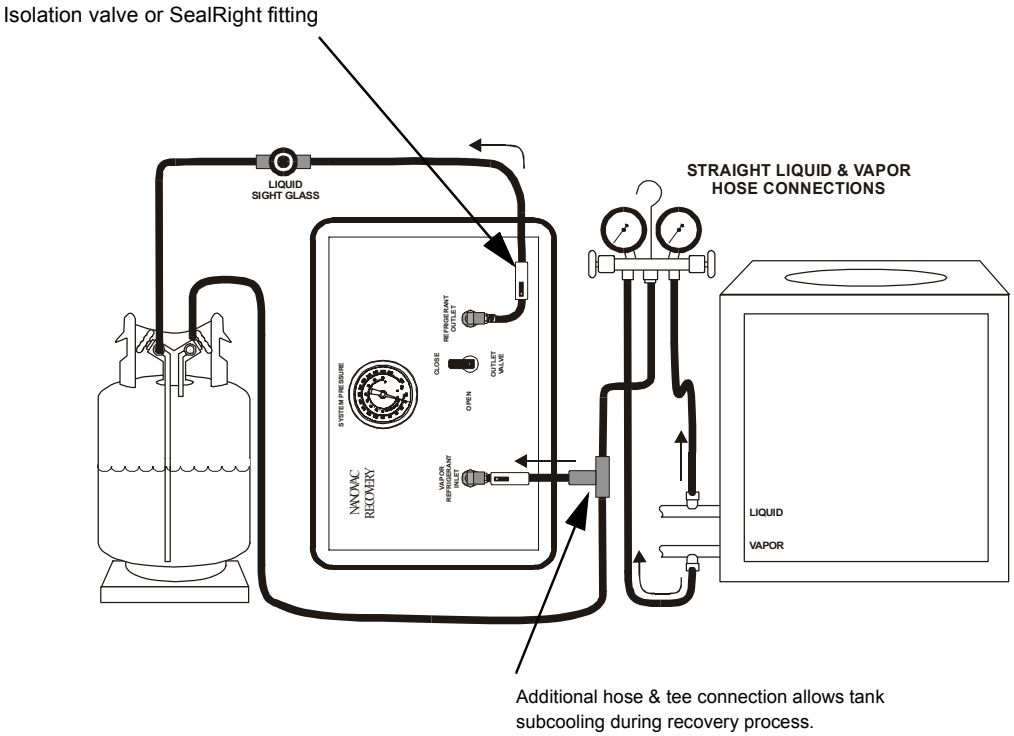
It is absolutely imperative that the refrigerant discharge-charge hose, at a minimum, have a SealRight fitting or an isolation valve located on its end nearest the *outlet* port of the NanoVac unit.

After liquid or vapor recovery has been completed, follow these procedures for discharge hose liquid clearing and NanoVac self evacuation.

Make sure that when recovery unit has reached final vacuum level and recovery is complete close both suction and discharge manifold valves, verify that manifold set and 1/4” refrigerant hoses are as shown below. Make sure that a 1/4” male flare tee is in-line with the recovery tank vapor port and the NanoVac inlet line.

Open vapor valve from the tank to the inlet of the NanoVac. The tank internal pressure will begin to subcool and pressure will decrease drawing majority of liquid and gas from recovery unit, this may take several minutes. Once pressure in tank has dropped close tank vapor valve and watch inlet gauge on NanoVac. When gauge reaches a vacuum close liquid valve on recovery tank and disconnect hoses.

Figure 3 — Hose Clearing and Evacuation Diagram



Lowering Recovery Tank Internal Pressure

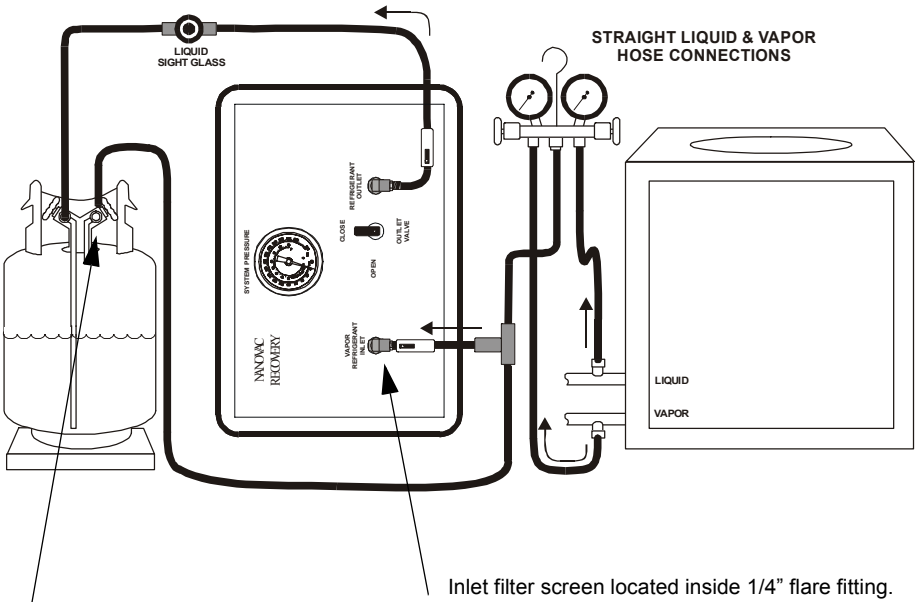
Lowering Recovery Tank Internal Pressure due to Presence of Noncondensibles or High Ambient Temperatures

Connect manifold set and 1/4” refrigerant hoses as shown below. Install a 1/4” male flare tee in-line with the recovery tank vapor port and the NanoVac inlet line.

Operator regulates vapor from the tank to the inlet of the NanoVac by simply opening the tank vapor valve whenever tank pressure becomes too high. Closing the manifold set from the A/C system completely isolates the recovery tank for even faster tank subcooling. Refrigerant in the tank subcools when high pressure vapor exits the tank and is reprocessed by NanoVac then reinjecting into the recovery tank as a liquid. By metering refrigerant through the recovery tank liquid port and regulating the recovery tank vapor port, a flash cooling effect occurs that eventually lowers the tank’s internal temperature and pressure.

a) If tank pressure gauge surpasses 375-psig, open the recovery tank vapor valve.
b) When pressure returns to an acceptable level, close the recovery tank vapor valve.

Figure 4 — Recovery Tank Internal Pressure Diagram



Cleaning or Changing Replaceable Inline Screen

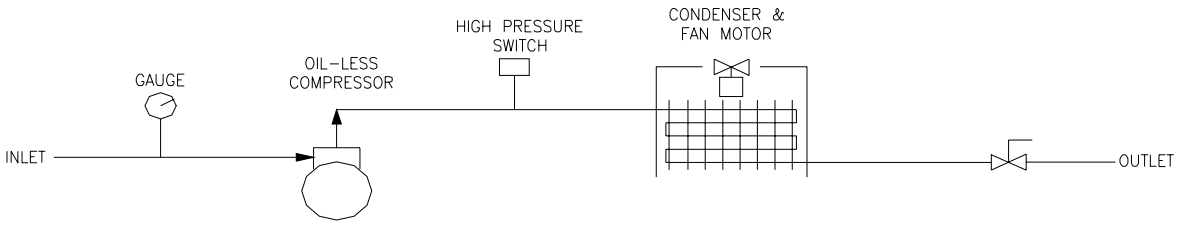
Be sure to replace or clean inline mess screen before every recovery job

1. Use back-up wrench on 1/4” female inlet fitting.
2. Unscrew 1/4” male flare inlet fitting.
3. Remove screen located behind fitting and clean or replace.

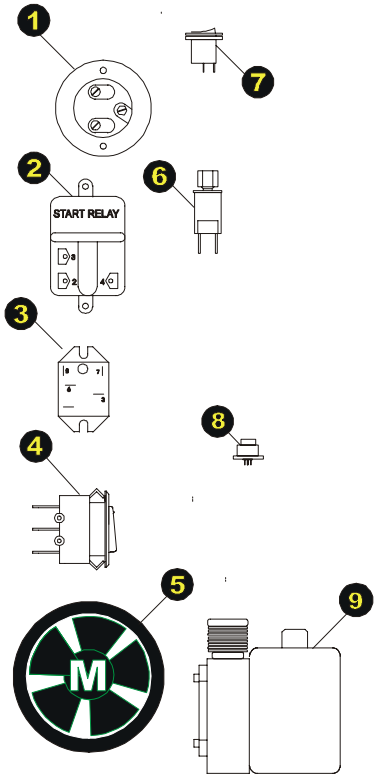
Failure to clean or use new mess screen on each and every recovery job may damage the oil-less compressor and void warranty.

Process and Identification Drawing

Figure 5 — Wiring Schematic

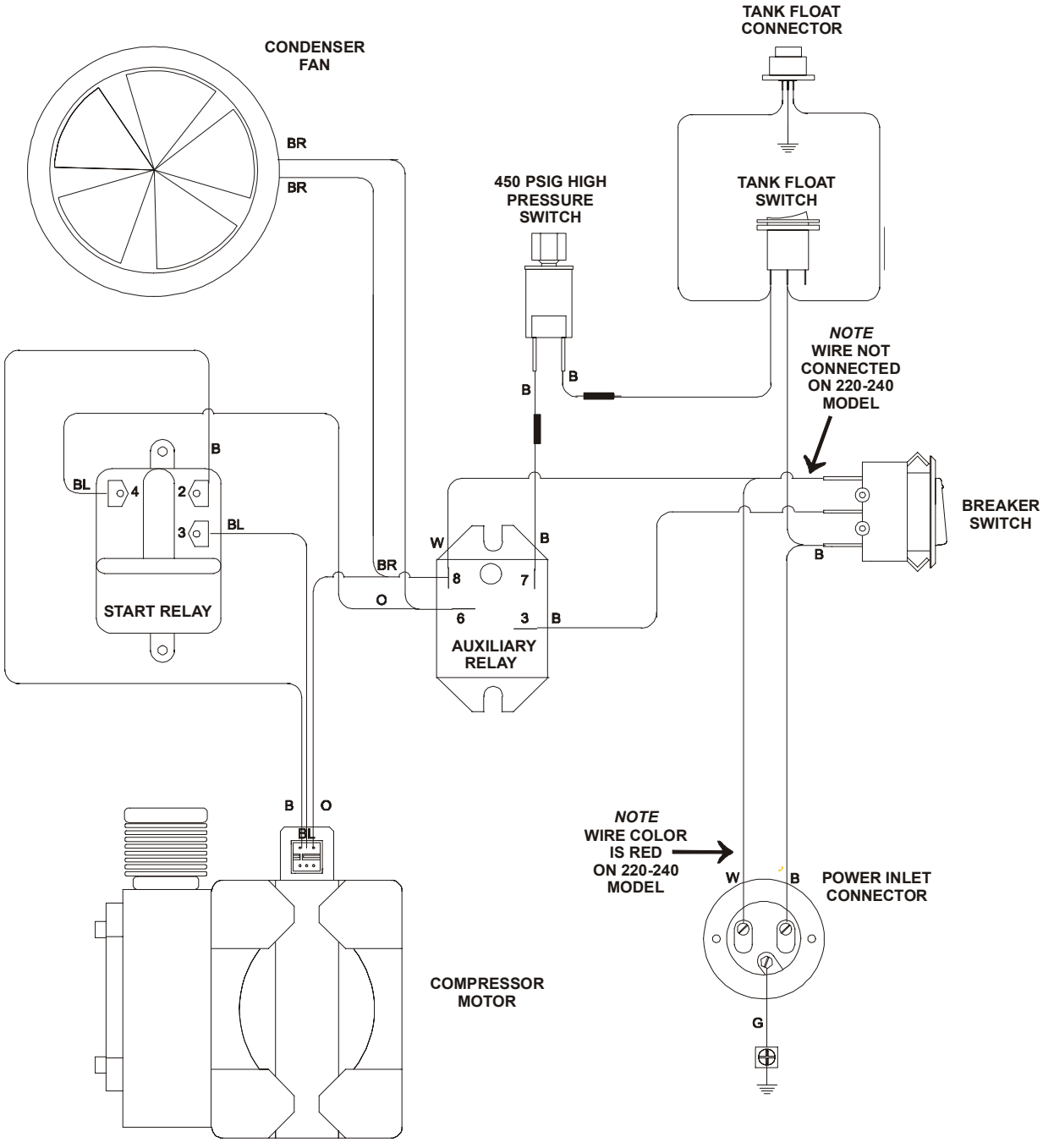


NanoVac Electrical Parts Breakdown



	Part Description	Part Description
1	115VAC Inlet Connector	240VAC Inlet Connector
2	Start Relay 120 VAC.	Start Relay 240VAC.
3	120 Vac, 50/60 Hz, SPDT Relay 12 FLA, 60 LRA. 120 Vac Coil	240 Vac, 50/60 Hz, SPDT Relay 12 FLA, 60 LRA. 240 Vac Coil
4	12 Amp Circuit Breaker Switch	10 Amp Circuit Breaker Switch
5	Condenser Fan Motor 35W, 115V, 50/60 Hz	Condenser Fan Motor 35W, 220-240V, 50/60 Hz
6	High Pressure Switch 450 Psig 24-240 Vac.	High Pressure Switch 450 Psig 24-240 Vac.
7	Float Bypass Switch 250 VAC.	Float Bypass Switch 250 VAC.
8	Tank Safety Float connector	Tank Safety Float connector
9	Compressor Motor 0.5 HP, 110/115 VAC, 50/60 Hz, 1Ph 1425/1725 Rpm 8.5 FLA.	Compressor Motor 0.5 HP, 220-240 VAC, 50/60 Hz, 1Ph 1425/1725 Rpm 4.0/3.5 FLA.

Figure 6 — NanoVac Internal Block Wiring Diagram



Parts List

Exploded View & Spare Parts List

Part #	Description	Part #	Description
1	Vapor Compressor Assembly	8	2-way Hand Valve
2	Electric Motor	9	Condensor Coil
3	Cooling Fan	10	Male Inlet
4	Circuit Breaker Switch	11	Inlet Port Assembly
5	Spdt Relay	12	Outlet Port Assembly
6	Start Relay	13	Float Connector
7	High Pressure Gauge	14	Float Bypass Switch

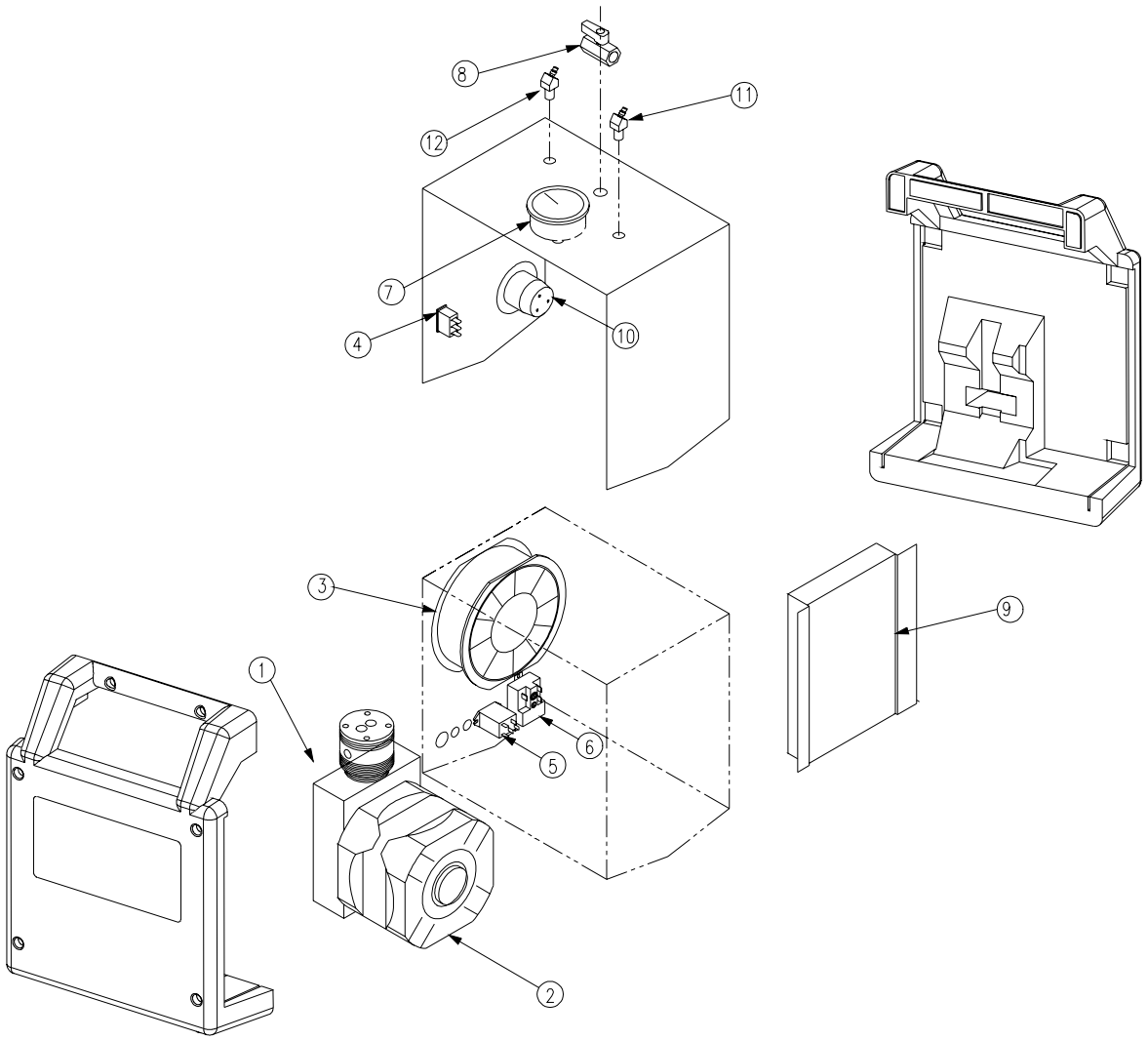
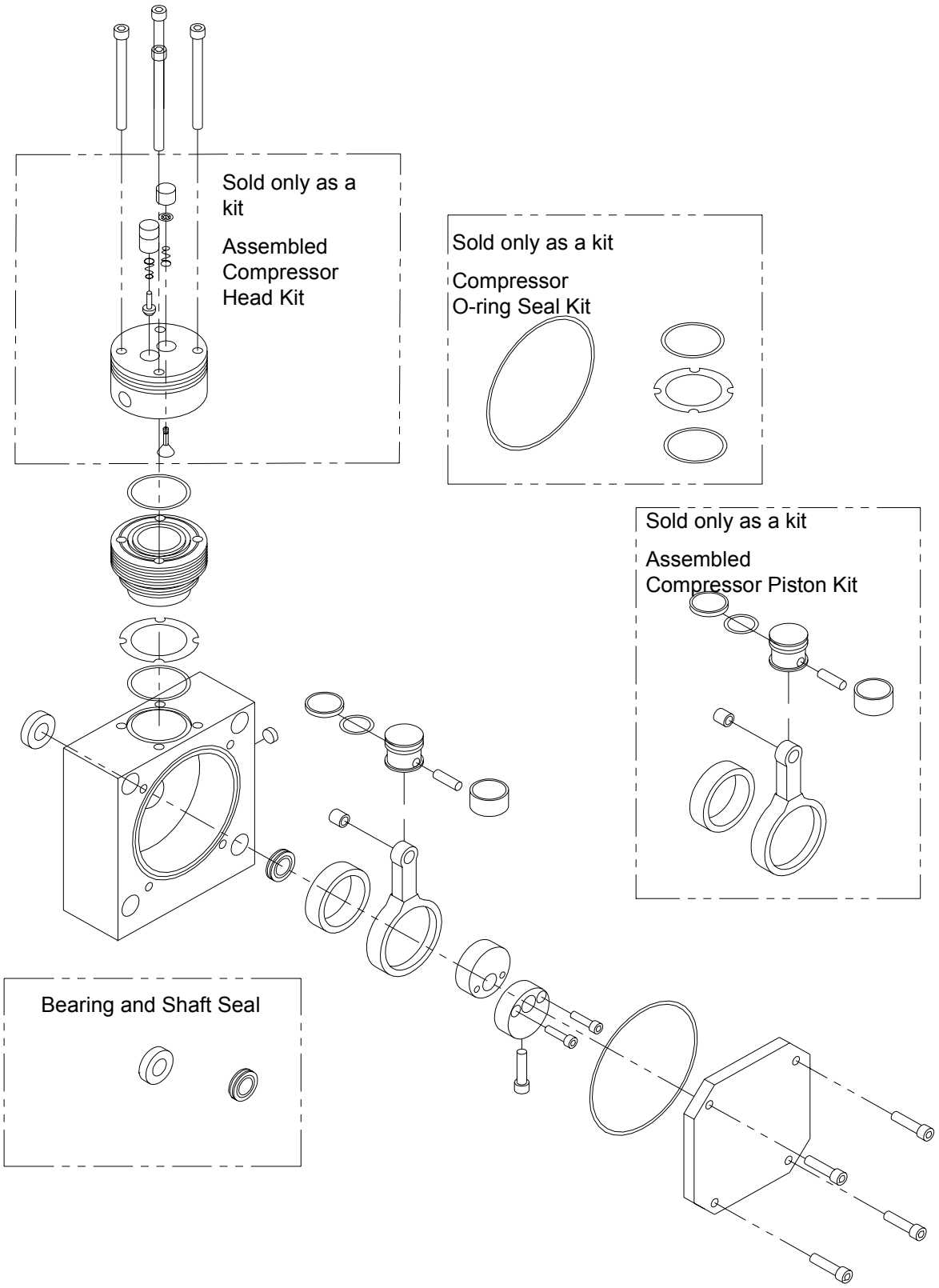


Figure 7 — Exploded View Compressor Drawing



⚠ WARNING

Refrigerant Exposure!

Follow all safety procedures described in the Material Safety Data Sheet and all labels on refrigerant containers for handling refrigerant.

Refrigerant exposure through inhalation or skin contact could result in death or serious injury.

Troubleshooting Procedures

If functional difficulties are experienced and the preceding normal operations do not resolve the problem, refer to the following troubleshooting chart for assistance.

Troubleshooting Guide

The following guide is provided to assist in analyzing problems that could occur.

Symptom: Describes what is happening;

Cause: Suggests possible sources;

Solution: Describes what must be done.

Symptom	Cause	Solution
Pressure differential between system and recovery tank becomes too high - greater than 50 psig.	Restrictions in recovery line. Restriction in liquid recovery lines or tank.	Tank needs to have a 1/4” ID or 3/8” ID valves.
Slow liquid transfer.	Restriction in flow.	Replace restrictive fittings and hoses with appropriate size to expedite transfer.
NanoVac running high head pressure back to recovery tank.	Restriction in hoses going to tank.	Replace with appropriately sized hoses and fittings. Run water over tank or add secondary water cooled condenser on liquid return line going to recovery tank. RefTec has available secondary water cooled and air cooled condensers.
	Check for proper air flow and that internal fan is running	
	Capacity of recovery tank is too small or tank is overfilled.	Replace with appropriately sized tanks.
	High concentration of noncondensibles.	Remove noncondensibles.
NanoVac Compressor will not restart.	Compressor thermal overload open.	Let unit cool down.
	High head pressure.	Open and close Outlet valve
NanoVac slow in recovery mode.	Restricted line to NanoVac liquid inlet port.	Verify inlet screen is not restricting flow and that the hose from system is not restricted.

Literature Order Number	RRHA-SVX01A-EN
File Number	SV-CAP-RR-RRHA-SVX-01A-0701
Supersedes	New
Stocking Location	La Crosse

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