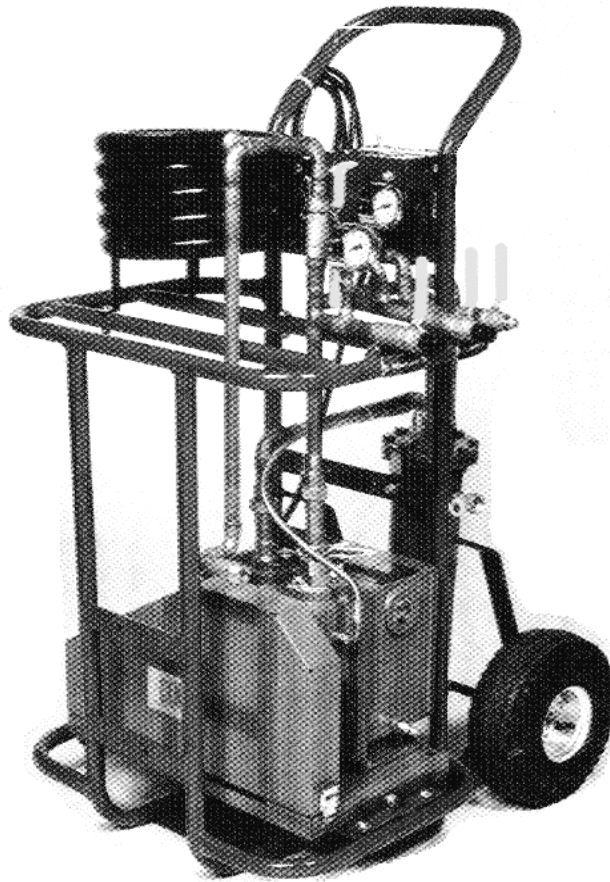


OPERATING INSTRUCTIONS



MODEL VR11 **REFRIGERANT RECOVERY UNIT**

NATIONAL REFRIGERATION PRODUCTS
985 WHEELER WAY • LANGHORNE, PA 19047
(215) 638-8909 • FAX (215) 638-9270

MODEL VR11 Recovery Unit for R11, R113, and R123

For safety reasons it is very important to fill all cylinders by weight in accordance with the cylinder supplier's instruction and ARI guidelines.

- ALWAYS USE HIGH PRESSURE CYLINDERS WITH 2 VALVES. CYLINDERS MUST BE DOT APPROVED, SUCH AS CYLINDERS SUPPLIED BY NRP.
- DO NOT OVERFILL CYLINDERS. Cylinders should be filled to a maximum of 80% capacity.
- DO NOT MIX DIFFERENT REFRIGERANTS IN A CYLINDER. Mixtures can not be separated.
- ALWAYS WEAR RUBBER GLOVES AND SAFETY GOGGLES WHEN TRANSFERRING REFRIGERANT.
- The VR11 has a 1 Horsepower, 115 volt, Single phase, 60 Hertz Motor.
- **ALWAYS USE A 304 FILTER DRIER BEFORE THE INLET VALVE OF THE VR11. THIS DRIER WILL CAPTURE PARTICULATE AND WILL PREVENT DAMAGES TO THE VACUUM PUMP.**

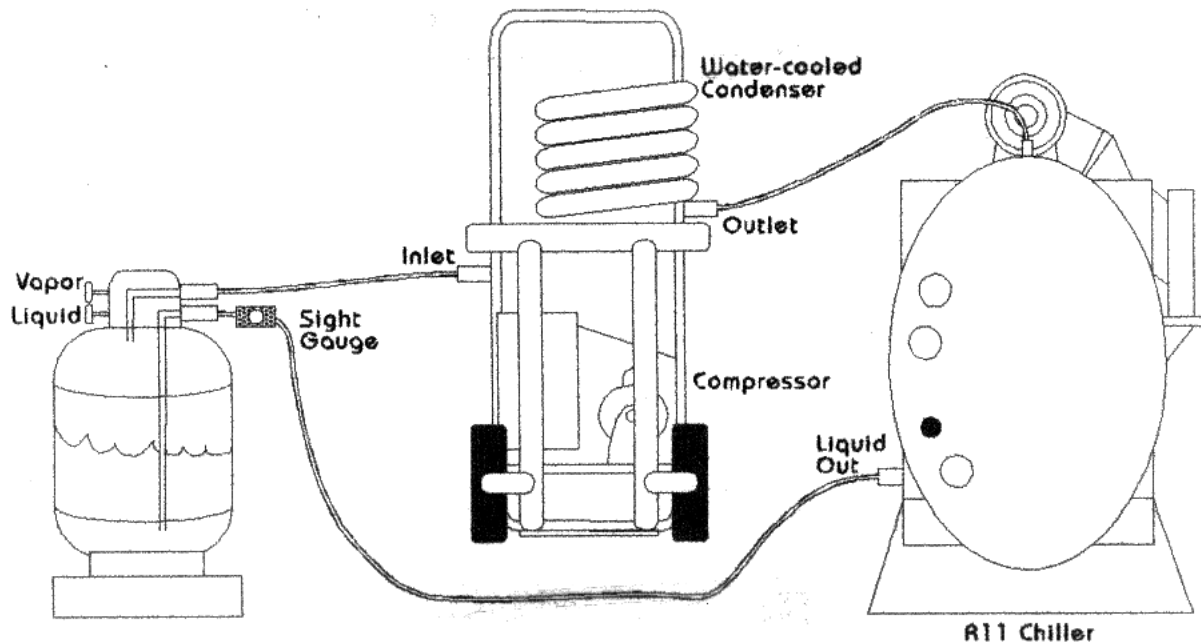
The VR11 Can Be Used In Four Different Ways:

1. Liquid Recovery
2. Vapor Recovery
3. Self-Pump Out of the VR11
4. Vacuum Pump to Evacuate the Chiller

- **Note: IF NITROGEN HAS BEEN USED TO PUSH LIQUID OUT OF THE CHILLER, OR THERE IS AIR MIXED WITH THE R11 VAPOR, PLEASE USE THE ALTERNATE VAPOR RECOVERY METHOD SHOWN ON PAGE 5.**

Liquid Recovery

R11, R113, or R123 liquid recovery can be done using a 2-valve recovery cylinder such as NRP models NC240, NC1000, or NC2000.



VALVES 1, 2 & 4 ARE OPEN
VALVES 3 & 5 ARE CLOSED

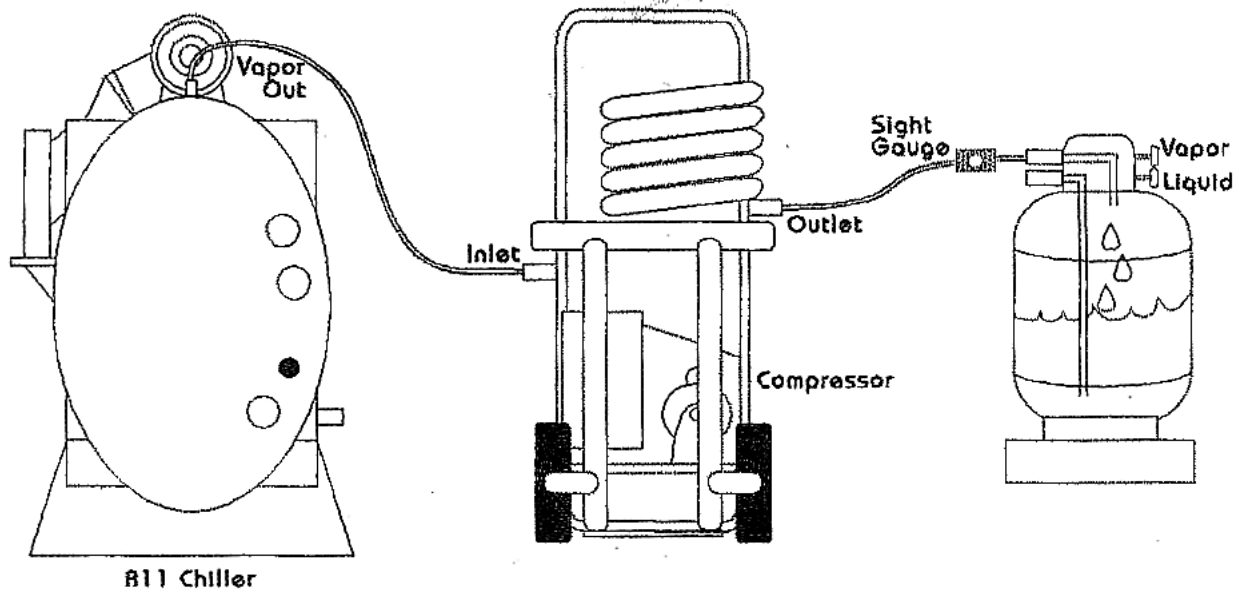
- A. The recovery cylinder is placed under vacuum by the VR11, and the chiller is pressurized, transferring the liquid refrigerant. This “push-pull” recovery method transfers the liquid refrigerant by using a pressure difference.
- B. Refrigerant pressure inside the chiller must be increased to 5 to 10 PSIG by raising the refrigerant temperature. This can be done by circulating warm water through the heat exchanger coils, or using an external heating blanket.

Vapor Recovery

The VR11 vapor recovery unit is designed for complete removal of R11, R113, or R123 vapors from centrifugal chillers after the liquid has been pumped out. The VR11 will allow you to recover R11 vapor trapped in various parts of the chiller.

The VR11 will pull refrigerant vapor from the chiller at a rate of approximately 0.8 pounds/minute. This condenser requires 3 gallons/minute of the city water. The condensed refrigerant is pushed into the recovery cylinder. Recovery is complete when the chiller pressure is 29" Hg vacuum.

**VALVES 1, 2 & 4 ARE OPEN
VALVES 3 & 5 ARE CLOSED**



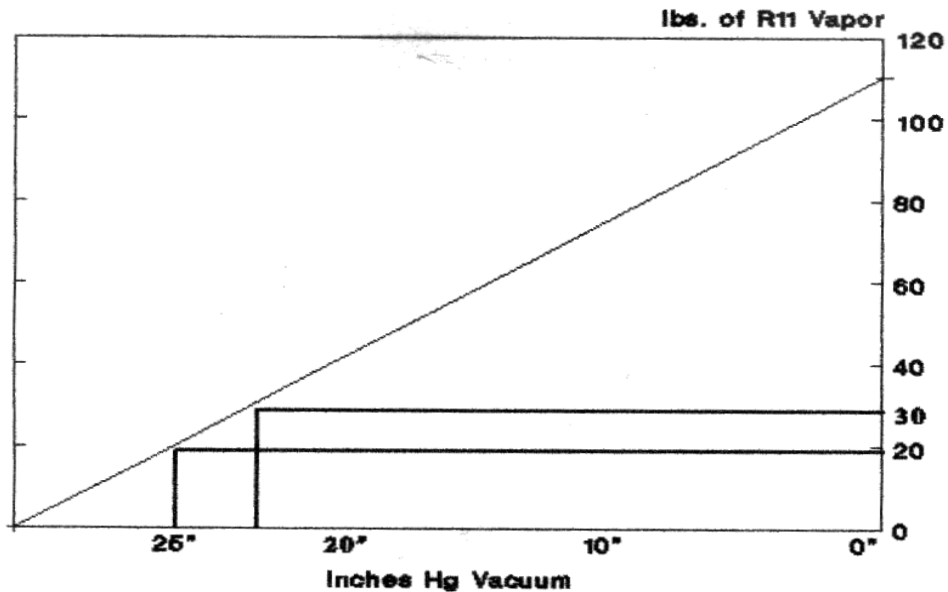
R11 VAPOR ALSO MUST BE RECOVERED TO MEET EPA REGULATIONS

Take an example of a 350 ton chiller, which has a charge of approximately 600 pounds of R11. the chiller, which is about 15 feet long, has a combined evaporator/condenser internal volume of 300 cubic feet.

From standard refrigerant tables, 0 PSIG R11 vapor weighs .364 pounds/cubic foot. After removing the R11 liquid (about 500 pounds), the 350 ton chiller will hold 109 pounds of R11 vapor at 0 PSIG.

If the chiller is evacuated to a vacuum of 22" Hg, approximately 30 pounds of vapor will remain, which is 5% of the total charge. At a vacuum level of 29" Hg, only 5 pounds of R11 vapor would remain. this is less than 1% of the total charge, which meets EPA requirements.

POUNDS OF R11 VAPOR LEFT IN A 350 TON CHILLER AT VARIOUS VACUUM LEVELS.



Self Pump Out

The VR11 can pump out and evacuate its condenser to prevent the mixing of refrigerants. Set the VR11 valves as follows for self pump out:

VALVES 1, 2, & 4 ARE CLOSED
VALVES 3 & 5 ARE OPEN

Open Valve 3 slowly and only part-way to avoid returning liquid to the vacuum pump. This liquid would damage the vacuum pump. The refrigerant which was trapped in the VR11 recovery unit will be forced out into the recovery cylinder, and the VR11 will be under vacuum.

Evacuation of the Chiller Before Recharging

The VR11 has a 10 CFM vacuum pump, rated at 50 microns, which can be used to evacuate the chiller or any other air conditioning or refrigeration system. In this case, a line can be connected to Valve 1 and another line to Valve 2. These lines can be connected to the two fittings of the unit to be evacuated. The VR11 valves should be set as follows:

VALVES 1, 2, 3, & 5 ARE OPEN
VALVE 4 IS CLOSED

NOTE: Before recovery, the VR11 can be used to evacuate hoses and the recovery cylinder. The VR11 valves should be set as follows:

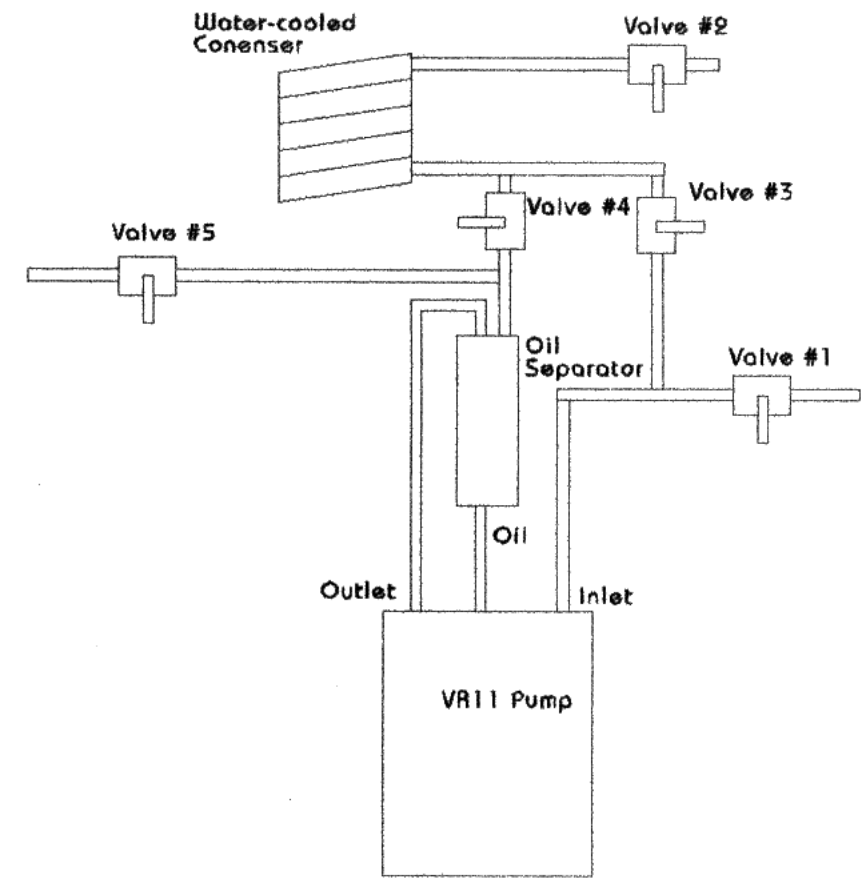
VALVES 1, 2, 3, & 5 ARE OPEN
VALVE 4 IS CLOSED

The VR11 vacuum pump will evacuate and discharge non-condensables through Valve 5 into the atmosphere.

The final vacuum level obtained in the chiller will depend on the amount of time spent evacuating the chiller and the amount of air leakage into the chiller. The vapor recovery rate and the time required for evacuation will be affected by the recovery line size and the chiller connection to a 1" fitting at the chiller is used instead of a standard 1/4" fitting.

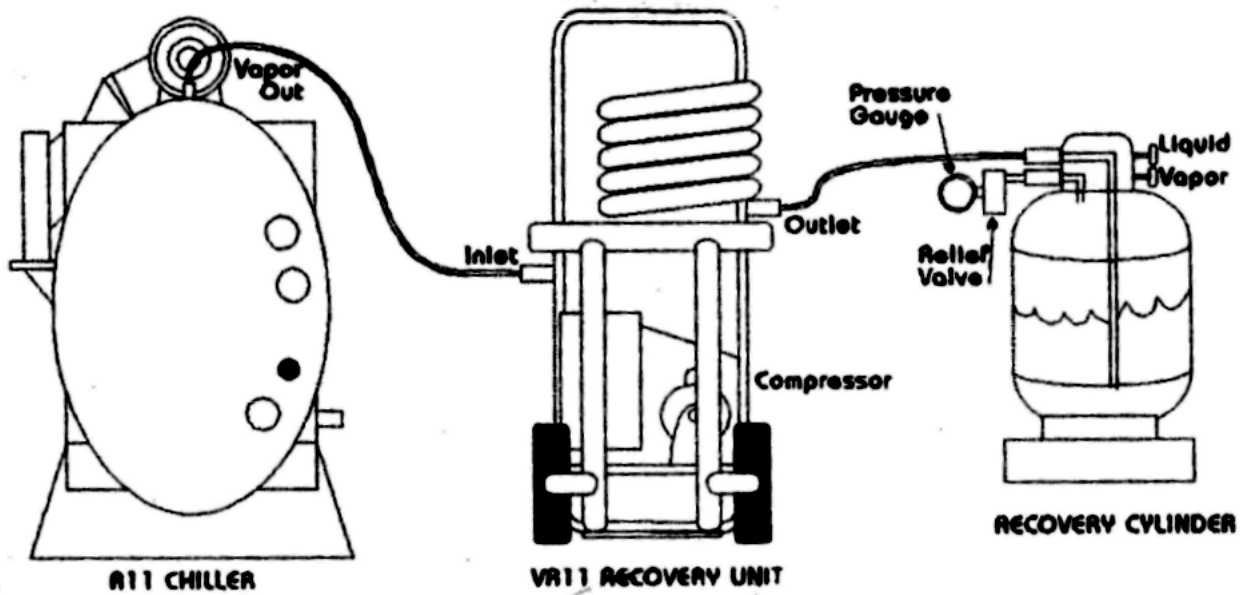
FOR OPTIMUM PERFORMANCE, THE VACUUM PUMP OIL MUST BE CHANGED AFTER EACH RECOVERY OR EVACUATION OPERATION. USE NATIONAL REFRIGERATION VACUUM PUMP OIL. FILL PUMP TO HALF SIGHT GLASS MAXIMUM.

VR11 PIPING DIAGRAM



Alternate Vapor Recovery Procedure

This procedure should be used if nitrogen is used to force the R11 liquid out of the chiller, or if there is air mixed with the R11 vapor. In order to thoroughly separate the non-condensables from the R11 vapor, it is important that the setting of the relief valve be 20 PSI above the saturated condensing temperature of the R11. If entering water temperature is 65°F or less, the refrigerant will condense and be sub-cooled to 75°F to 80°F. In this case, the relief valve should be re-adjusted to 30 PSIG to relieve the non-condensables.



WARRANTY

National Refrigeration Products (NRP) Recovery Equipment is warranted to be free of manufacturing defects. NRP will repair or give credit for repair, at NRP's choice, if any NRP Recovery units or accessories have manufacturing defects. Any warranty claim must be submitted in writing within one year of purchase with a copy of the invoice. In no event shall NRP be liable for the cost of the labor charges, lost profits, injury to good will, or any other special or consequential damages for defective goods, late delivery, or non-delivery. There are no warranties which extend beyond the description on the face hereof, and NRP makes no warranty of merchantability or fitness for specific purpose. Warranty does not cover damage by improper operation or abuse.

NOTE: THE VR11 COMPRESSOR WILL BE DAMAGED IF LIQUID IS INTRODUCED AT THE INLET VALVE OF THE VR11. THIS DAMAGE BY SLUGGING IS NOT COVERED BY WARRANTY.