

# Van Steenburgh Refrigerant Reclaim System

## CV Series



## Operations Manual

# Contents

## Introduction

Purpose	3
General	3
Series CV	4-7
Operation Recap	8

## Getting Started

Set up Procedures	9
Operating Characteristics	10
Hints	11

## Operation

Refrigerant In	13
Pass Through Operation	14
Pass Through with Chill	14
Pumping to Required Vacuums	15
Chiller	16
Drier/Filter	17
Non Condensable Purge Procedure	17
Refrigerant Out	18
Oil Out	19
Changing Refrigerants	20

## Maintenance

Adding Oil	22
Changing Drier/Filter	22

## Trouble Shooting

## Parts List

## Specifications

## ARI-740 Test Results

## Flow Chart

## Wiring Diagram

**Van Steenburgh**  
Engineering Laboratories, Inc.  
1825 No. Lake Ave.  
Estes Park, CO 80517  
Ph 970/586-8412 • Fax 970/586-8060

## **Introduction**

### **Purpose**

The Van Steenburgh Refrigerant Reclaim System is used to reclaim R-12, R-22, R-502 and R-500 and *all alternate* refrigerants in the same range from a refrigeration or air conditioning system. It can also be used to remove or transfer refrigerant from cylinders or systems and to store refrigerant within its storage/chill chamber.

### **General**

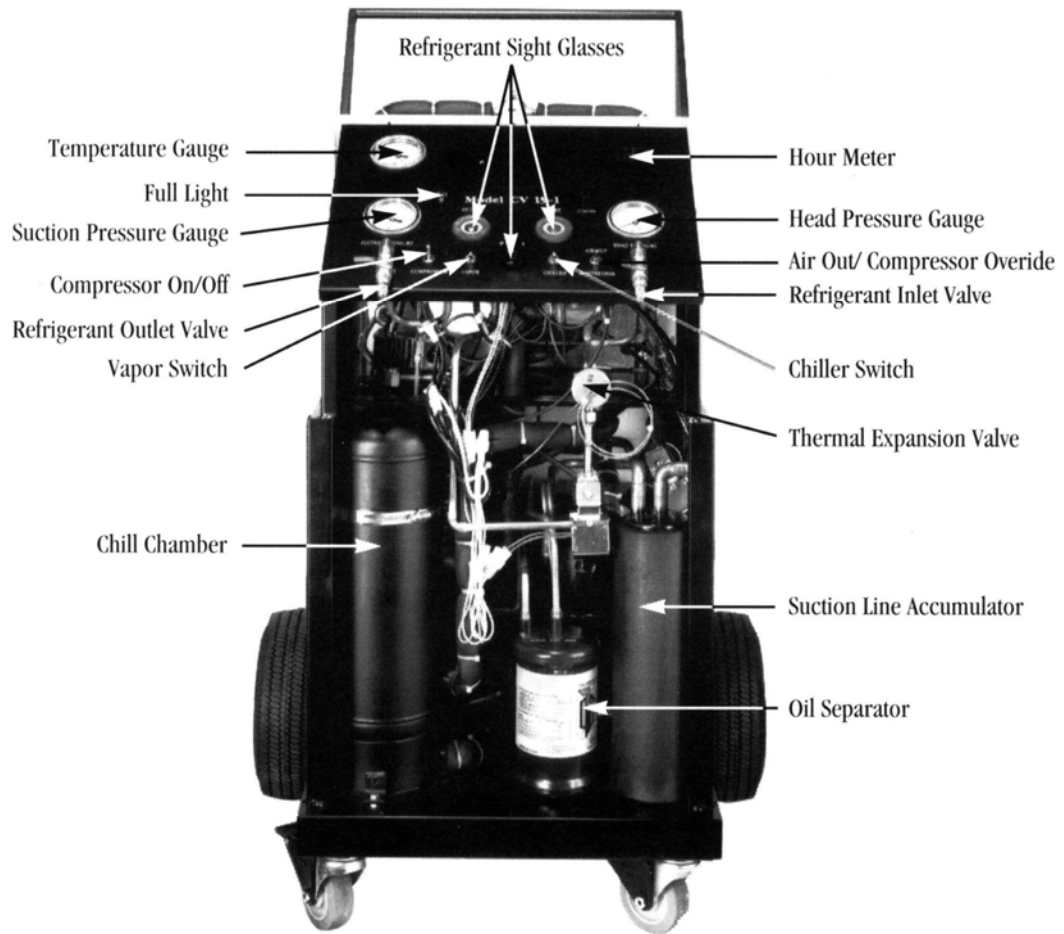
The Van Steenburgh Refrigerant Reclaim System is a fully integrated piece of equipment. All necessary elements are self-contained including the storage/chill chamber which is a specially engineered pressure vessel welded in place.

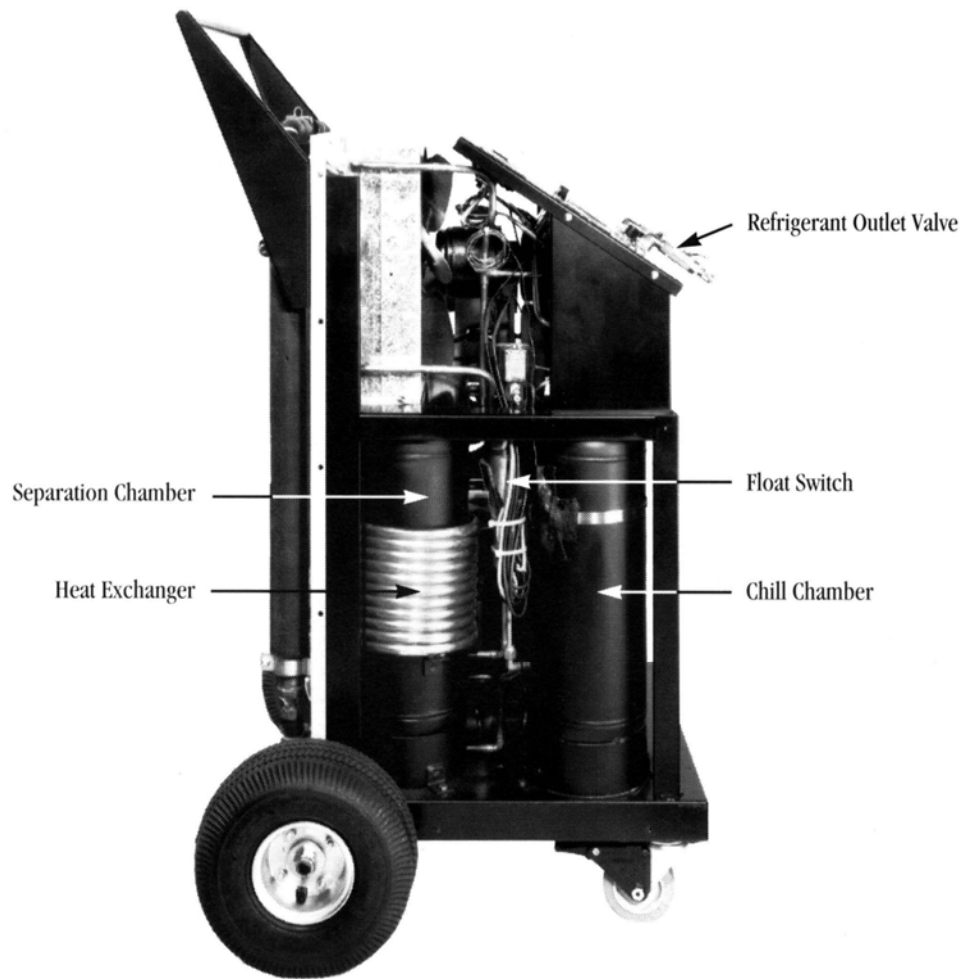
The system is designed and constructed of top quality steel cabinetry and finished with bonded epoxy paint. All component parts are of the highest quality including all gauges, solenoids, valves, controls and switches. All parts are available from the manufacturer (see **Parts List**).

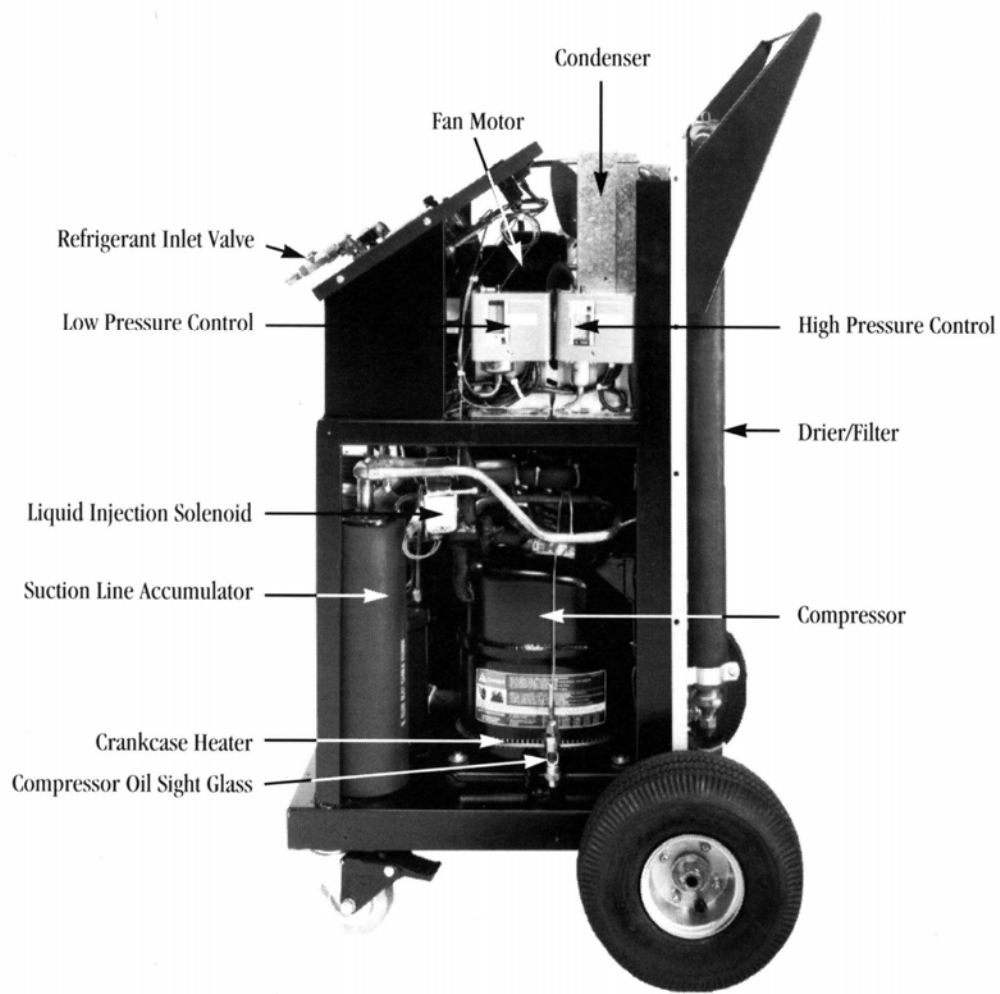
The equipment is designed with the technician and work place in mind. The gauges are laboratory quality to assure long life and excellent calibration. Switches are clearly marked and easily accessible on the front control panel.

Your Van Steenburgh system has been ruggedly constructed with your day-to-day activities in mind. All refrigerant carrying tubing is insulated to aid in efficient operation and the cabinet and frame are reinforced for sturdiness.









## Operation Recap

1. Refrigerant can be taken into the system as EITHER vapor or liquid.
2. It is taken to high temperature and high velocity using the heat of compression and the heat from the compressor discharge.
3. It then enters a large unique Separation Chamber where the velocity is reduced to near zero. During this phase, copper chips, carbon, oil, acid, water and all other contaminants drop to the bottom of the Chamber where they can be removed during the “oil out” operation. (this process also allows you to accurately determine the amount of oil removed from a reclaimed system since all of it remains in the bottom of the Separation Chamber).
4. The distilled vapor, at high temperature, rises and passes from the Separation Chamber to the compressor, the tube in tube Heat Exchanger, then to the air cooled condenser where it is converted to liquid
5. The liquid passes into the on-board storage chamber. Within this chamber an evaporator assembly including thermal expansion valves that correspond to the type of refrigerant sub-cools the liquid to 20 to 40 degrees F / -6.7 to 4.4 degrees C (depending on several variables) during the CHILL operation.
6. A pair of replaceable Filter/Driers in this circuit removes any remaining moisture while finalizing the cleaning process.
7. Chilling the refrigerant also facilitates the transfer of the refrigerant to any external cylinders or systems at ambient temperature.

**NOTE:** It is best NOT to over chill the refrigerant in the system. Over chilling can cause frost, or even ice, to form on the valves and chambers, especially in higher humidity areas. As it melts, it leaves water within the unit, which can gather on the floor of the cabinet causing problems.

## Getting Started

### Set Up Procedures

Each system is thoroughly tested before it leaves the factory. At the completion of the test procedure each unit is pressurized with nitrogen to protect it during shipping. Your unit will have a tag on the front indicating this.

1. Remove unit from shipping crate. Make a thorough visual inspection of the unit making sure there is no shipping damage. If any damage is noted, contact the shipping company.
2. Verify voltage and amperage on serial tag on rear of unit.
3. Open the INLET and OUTLET valves (with unit plugged into proper voltage), this will release the nitrogen holding charge. Hook vacuum pump to both REFRIGERANT INLET and REFRIGERANT OUTLET fittings. Pull a vacuum until system reaches 1000 microns.
4. Check Suction Gauge to ascertain vacuum level. Close both the Inlet and Outlet Valves.

You are now ready to accept refrigerant. **MAKE CERTAIN THE REFRIGERANT SELECTOR KNOB INDICATES THE APPROPRIATE REFRIGERANT.** Refer to Refrigerant In procedure for instructions.

## Operating Characteristics

The individual sections in this Operator's Manual deal with the step by step actions for the operating procedures. The following operating characteristics apply in general and should be taken into consideration.

1. ALL Van Steenburgh Reclaim Systems are industrial grade equipment. They are based on established sound heat transfer principles and depend, to an extent, on the refrigerant in the reclaim system to achieve maximum performance. Consequently, you will achieve the best results if you follow some basic procedures.
  - A. Before starting to reclaim refrigerant from a source, pull 3 to 5 lbs / 1.36 to 2.2 kg of *the same* refrigerant as you are preparing to reclaim into the machine from a cylinder. Leave that amount in the Reclaimer for the next and subsequent uses.
  - B. Before starting reclaiming operations, turn compressor switch ON (if not already on) and chiller switch ON prior to starting. Let machine run for approximately 5 or 10 minutes. This will warm up the compressor and assure maximum efficiency in the Separation Chamber.

This simple warm up activity will help considerably towards assuring smooth operation and clean refrigerant because the heat exchanger will be up to temperature and this will assure good "separation" as the refrigerant enters the separation chamber.

2. The OIL OUT operation is especially important for trouble free operation. By conducting frequent OIL OUT procedures, you will keep the separated oil below the level of the chamber's entry port and assure that the oil/moisture mix will not start foaming and re-entrain with the vapors.

**NOTE:** Avoid using Extension Cord. It may overheat. If necessary to use cord, use shortest possible length of No. 12 AWG minimum.

## Hints

### Long Hose “Pulls”

On occasion, longer lengths of hose are required when it is not possible to get the Reclaimer to the source. In these cases it is important to remember the following:

- A. Always use the largest diameter refrigerant hose possible – at least a 3/8”/.952 cm.
- B. The line loss will begin to have a more noticeable effect after 25 feet/7.62 meters
- C. At 50 feet/15.2 meters (75degrees / 23.9 degrees C) the liquid capacity will be reduced by 20 percent. The vapor capacity, however, will be diminished by 67 percent!
- D. Pumping capacity will diminish drastically as hose lengths exceed 50 feet.

### Low Ambient Operations

The Reclaimer is no different from any other piece of equipment that depends on a compressor. The lower the ambient, the more important it is to assure the compressor is warm enough.

Here are some hints:

- A. Don't leave Reclaimer in a service truck overnight during cold weather. Leave it at a warm location.
- B. Low ambient temperatures will mean longer “pull” times. Hooking into liquid side is even more important during these conditions.

### Transferring Refrigerant

Transferring sub-cooled refrigerant from the reclaimer following the chiller process is aided by a combination of things:

- A. The sub-cooled refrigerant entering a cylinder or system at a higher ambient condenses the vapor and lowers the pressure.

- B. The Reclaimer compressor, operating at much higher temperature and pressure, is driving the sub-cooled refrigerant from behind.

## **Care of Reclaimer**

If refrigerant is stored in Reclaimer during periods of non use, it is **imperative** that unit remains connected to power source with compressor switch in the on position. Should any refrigerant migrate to the compressor, the unit will start and pump down with the low pressure control shutting the system down at approximately “0” psig/bar. This will also provide power to the crankcase heater, which maintains the compressor oil at a constant temperature, thus boiling any refrigerant out of the compressor oil. This will assure a smooth start up when beginning reclaim operations.

**Caution: Failure to follow these instructions may cause serious compressor damage and void the warranty.**

# Operation

## Refrigerant In

1. Attach hose to the ¼” flare fitting labeled INLET.
2. Attach the other end of the hose to the refrigerant source. Purge hose. Use a gauge at reclaiming source. This will show when the source is empty.

***NOTE: HOOK UP TO LIQUID SIDE WHENEVER POSSIBLE.***

*Removing liquid first is much faster. It also serves to cool the motor compressor in the reclaimer. Other reasons to hook to liquid side:*

- A. Drawing from vapor side means you will be boiling the liquid without a heat source, which will drastically reduce the efficiency of the operation.
  - B. If there is refrigerant in the oil of the source compressor, it will cause oil to leave and enter the Reclaimer.
3. Turn the COMPRESSOR switch ON and open INLET hand valve. Reclaimer will start to pump.

**NOTE:** With the VAPOR switch also on, the liquid injection solenoid will activate when suction pressure gets down to approximately 3 to 4 psig/.204 to .272 bar. By diverting liquid refrigerant from the on board storage to the compressor by means of a liquid injection valve the compressor is kept cool as you continue to pump the remaining vapor from the source. (SEE PUMPING TO REQUIRED VACUUMS)

4. An Electric Float Switch shuts off an inlet solenoid when machine is full to prevent overfilling the on-board cylinder. The Float switch is so placed to leave room for expansion of refrigerants at high ambients.

## **Pass Through Operation**

1. Attach a hose to the source to be reclaimed. Attach other end to the Reclaimer fitting labeled INLET. (See **Refrigerant In** for hints.) Purge hose.
2. Attach hose to reclaimer fitting labeled OUTLET. Attach other end of this hose to the VAPOR side of the storage cylinder to which you wish to transfer. Purge hose.
3. With COMPRESSOR switch ON, open both INLET and OUTLET valves. Refrigerant will pass through reclaimer and go directly to the receiving container hooked to the OUTLET fitting.

## **Pass Through with Chill**

This procedure will afford the opportunity to achieve additional chilling while also circulating the refrigerant through the drier/filter as it goes through the reclaimer. This procedure will be slightly slower but will give you the benefit of chilling.

1. Attach a hose to the LIQUID side of the source to be reclaimed.
2. Open the inlet by turning the inlet valve ON. Pull in the refrigerant until the reclaimer full light goes on and the reclaimer is full.
3. Close the INLET and turn CHILL switch ON. Let reclaimer run the chill mode for 15 to 20 minutes.
4. Hook hose from OUTLET of reclaimer to the VAPOR side of the storage cylinder or system. Purge hose.
5. Open OUTLET of reclaimer. Let refrigerant pass to cylinder.
6. Turn ON compressor and INLET after full light goes off and a small amount of refrigerant has passed to storage cylinder.
7. Adjust INLET and OUTLET to an even flow.
8. Continue pass through operation until suction pressure drops indicating vapor is being pumped from source.

9. Close OUTLET and complete operation per PUMPING TO REQUIRED VACUUM to bring source into compliance with vacuum level.
10. Chill remaining refrigerant and transfer to cylinder using standard REFRIGERANT OUT procedure.

## **Pumping To Required Vacuums**

As the reclaimer continues to pump, and you reach the vapor stage of the source charge, the suction pressure will drop. With the VAPOR switch ON, the liquid injection valve will open at approximately 3 psig. This cools the compressor during low mass flow operations as it continues to draw the source down.

To pump the last pounds and take the source to the required EPA vacuum levels, proceed as follows:

1. When both gauges (source and reclaimer suction) are equal (about 3 psig) turn the VAPOR switch OFF.
2. The low pressure control will control the compressor and the reclaimer will pump down and shut off.
3. Wait until the two gauges (source and reclaimer suction) equalize. **Note:** Be certain all refrigerant is accounted for in source (from remote condensers, multiple evaporators, etc.). This may take some extra time. Overriding compressor prematurely may cause overheating.
4. While watching the source gauge, push the COMPRESSOR OVERRIDE SWITH (on the right side of the control panel) down and hold.
5. Watch source gauge until it reaches the required vacuum level per the following chart.

Type	Inches Hg	Bar
HCFC-22, <i>less than</i> 200 lb. Of refrigerant	0	0
HCFC-22, <i>more than</i> 200 lb. Of refrigerant	10	.33
Other high pressure units normally containing <i>less than</i> 200 lb.	10	.33
Other high pressure units normally containing <i>more than</i> 200 lb.	15	.49

## Chiller

After Refrigerant in operation has been completed, remove hose and cap inlet fitting with supplied caps. Turn CHILLER switch and COMPRESSOR switch ON and allow reclaim system to operate for a minimum of 0.4 hours as indicated by the hour meter or, if possible, up to 0.5 hours.

This operation circulates the on-board reclaimed refrigerant through an evaporative cooler and Drier/Filter at approximately 200-300 lbs./90.9-136.36 kg per hr. rate. This will provide a final cleaning of any microscopic particles and remove any remaining moisture.

**NOTE:** Chill time is based on a full unit.

If you choose to store the refrigerant in the reclaimer, turn switches OFF except COMPRESSOR, close hand valves securely and leave the refrigerant in the chill chambers. This will allow the system to pump down if any refrigerant inadvertently migrates to the compressor. **See Care of Reclaimer on Page 12**

**NOTE:** Before removing refrigerant it is recommended that you re-chill before beginning REFRIGERANT OUT process. (See **Refrigerant Out** for explanation).

## **Drier/Filter**

**NOTE:** A moisture indicator sight glass is provided in series BETWEEN the two Drier/Filter “towers” as an additional monitor. This can be used in conjunction with the hour meter to monitor the reclaimed product.

For best results the Drier/Filter should be changed after each 3 hours of chilling operation.

## **Non condensable Purge Procedure**

After refrigerant recovery from source AND BEFORE CHILLING allow the reclaimer to pump down and the Compressor to shut off.

1. Wait a minimum of 5 minutes for system temperature to stabilize.
2. Observe and note temperature reading on temperature gauge located on front panel.
3. Refer to temperature/pressure chart (calculated to your elevation above sea level) and determine saturation level.
4. Compare Head Pressure Gauge reading with pressure reading from the chart.
5. If Head Pressure is more than 10 psi/.68 bar above reading on chart, purging is necessary.
6. Using AIR OUT switch on front panel, purge for 15 seconds.
7. Wait 3 minutes and make comparison (4 above) again.  
Repeat steps 5, 6 & 7 until temperature and pressure on chart agree within 10 psi/.68 bar of pressure shown on Head Pressure Gauge.

## **Refrigerant Out**

After the CHILL operation has been completed and the refrigerant is thoroughly chilled, proceed as follows:

1. Attach hose to the fitting labeled OUTLET. Attach the other end of the hose to the vapor side of a storage cylinder or system you wish to transfer to. Purge the hose.
2. With COMPRESSOR ON open the OUTLET hand valve. The refrigerant will begin transferring. Leave CHILL switch ON until bubbles appear in the outlet sight glass then turn CHILL switch OFF.

**NOTE:** It is important that the refrigerant is chilled prior to beginning this procedure. This facilitates the transfer because the sub-cooled refrigerant will immediately condense the vapor in the cylinder or system, lower the pressure and cause the refrigerant to pump over. (See **Trouble Shooting** section for additional hints in transferring).

**NOTE: ONLY AN EXPERIENCED OPERATOR SHOULD DISPENSE REFRIGERANT. It is extremely important to understand thoroughly the expansion/contraction properties of refrigerant.**

**DO NOT OVERFILL. Fill only to 75% to 89% capacity. LEAVE ROOM FOR EXPANSION.**

**DO NOT USE DISPOSABLE REFRIGERANT CYLINDERS. This is extremely dangerous and could result in serious bodily harm or even death. Use only refillable containers.**

**KNOW YOUR EMPTY WEIGHTS AND FULL WEIGHTS FROM THE CYLINDER MANUFACTURER BEFORE BEGINNING THIS OPERATION.**

## Oil Out

For best results drain oil from Separation Chamber after every 0.16 hours of operation. This will keep oil level down in the Chamber and prevent it from re-entering into the reclaimed refrigerant.

To remove the separated oil and other contaminants from the Separation Chamber, proceed as follows:

1. With Refrigerant IN and Refrigerant OUT both closed and with Compressor ON, allow unit to pump down and shut off. Turn Compressor OFF.
2. Using Compressor override switch located on the right side of panel, pull suction pressure into a 2 to 4 inch vacuum. Let unit sit 3 minutes.
3. Using Chiller switch, pop switch up a few times to put 3 to 4 lbs. pressure on Suction Pressure Gauge.
4. Connect the OIL OUT access valve which is supplied with the unit to the OIL OUT flare at the back of the reclaimer.
5. Assure that the knob on the access valve is turned OUT or counterclockwise.
6. Place a container in front of the OIL OUT fitting to catch the oil. *A Pyrex glass container with graduations works especially well because you can determine accurately the amount of oil removed.*
7. Turn the access valve SLOWLY *clockwise* while the oil begins to flow. When it stops flowing, vapor will appear.
8. Turn valve OFF counterclockwise.

**NOTE:** *If the refrigerant source has been a system with a “dead” compressor or a compressor which has not been running prior to reclaiming, you can, with this process, determine how much oil to replace in the evacuated system.*

## Changing Refrigerants

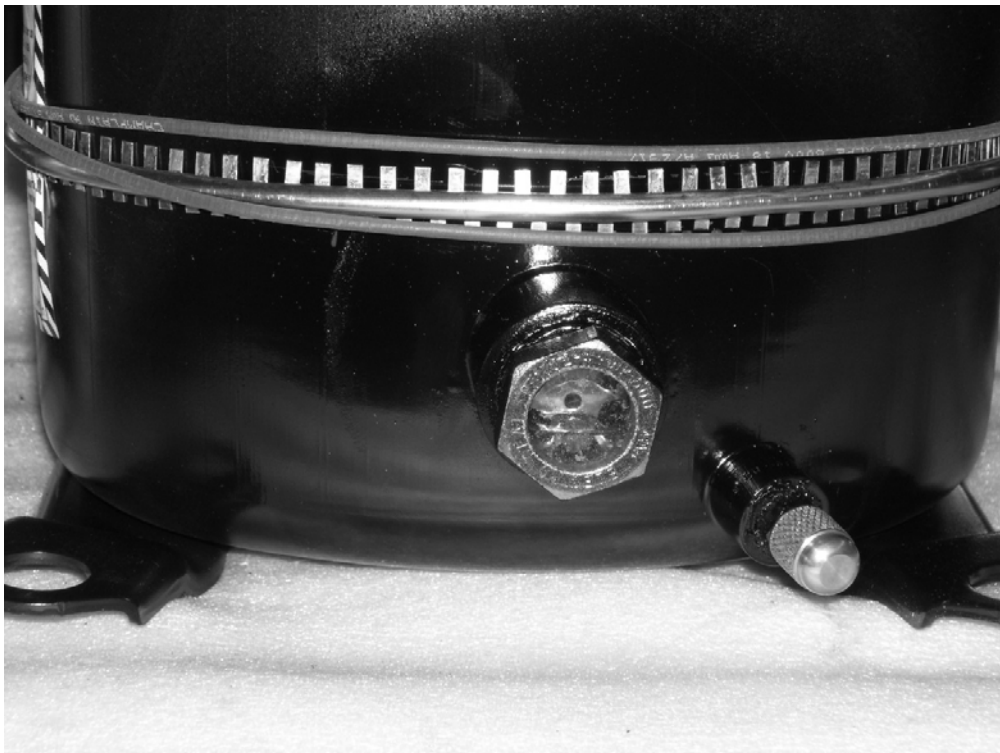
To change from one refrigerant type to another, proceed as follows:

1. With compressor ON and all other switches and valves in neutral or OFF, turn CHILL switch ON and complete CHILL operation.
2. Pump all refrigerant in Storage/Chill Chamber into available storage cylinder. (See **Refrigerant Out**).
3. At the completion of the REFRIGERANT OUT operation there will be a very small amount of refrigerant (priming charge) left. To remove this, hook to a cylinder, on which a deep vacuum has been pulled, to the REFRIGERANT OUT valve and open the valve. Remaining refrigerant will transfer to the cylinder.
4. Hook vacuum pump to both INLET and OUTLET fittings using “Y” hook up. All switches ON *except* compressor and both hand valves open.
5. Evacuate reclaimer. It is only necessary to run vacuum pump for approximately 4 to 6 minutes to clear reclaimer. It is NOT necessary to change the Drier/Filter.
6. Set selector knob on front panel to desired refrigerant.
7. Hook-up to new reclaiming source with different refrigerant matching the Selector Knob. Open *ALL* switches and hand valves and allow a positive pressure to appear on gauges. System is now ready to accept refrigerant.
8. Begin REFRIGERANT IN operation as outlined in **Refrigerant In Operation**.

## Maintenance

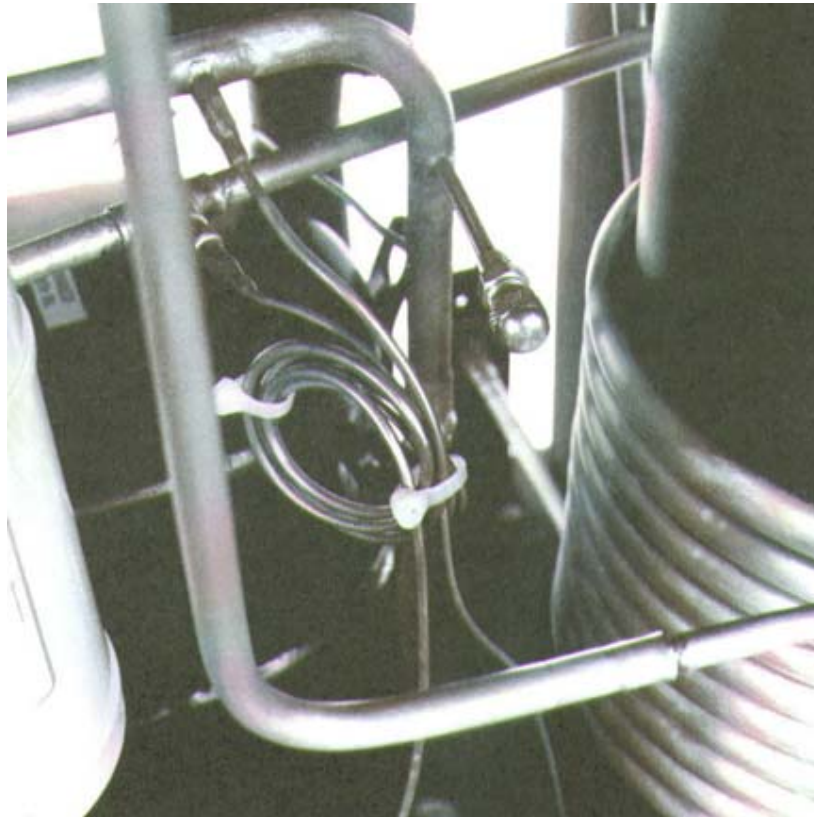
Complete the following preventive maintenance on a regularly scheduled basis.

1. Wipe front panels including gauge faces with a clean cloth to keep switch labels and gauge faces clear and readable.
2. Clean and check vent areas on side of machine to assure maximum air flow over condenser.
3. Check Oil Sight Glass on compressor. This visual check must be made with 0 PSIG indicating on the SUCTION gauge. If oil is needed, replace with R-22 hermetic compressor oil (SG-150 or equivalent) or Mobil Artic EAL 22 (POE) depending on refrigerant. Oil should be visible in the Level of the sight glass.



## Adding Oil To Compressor

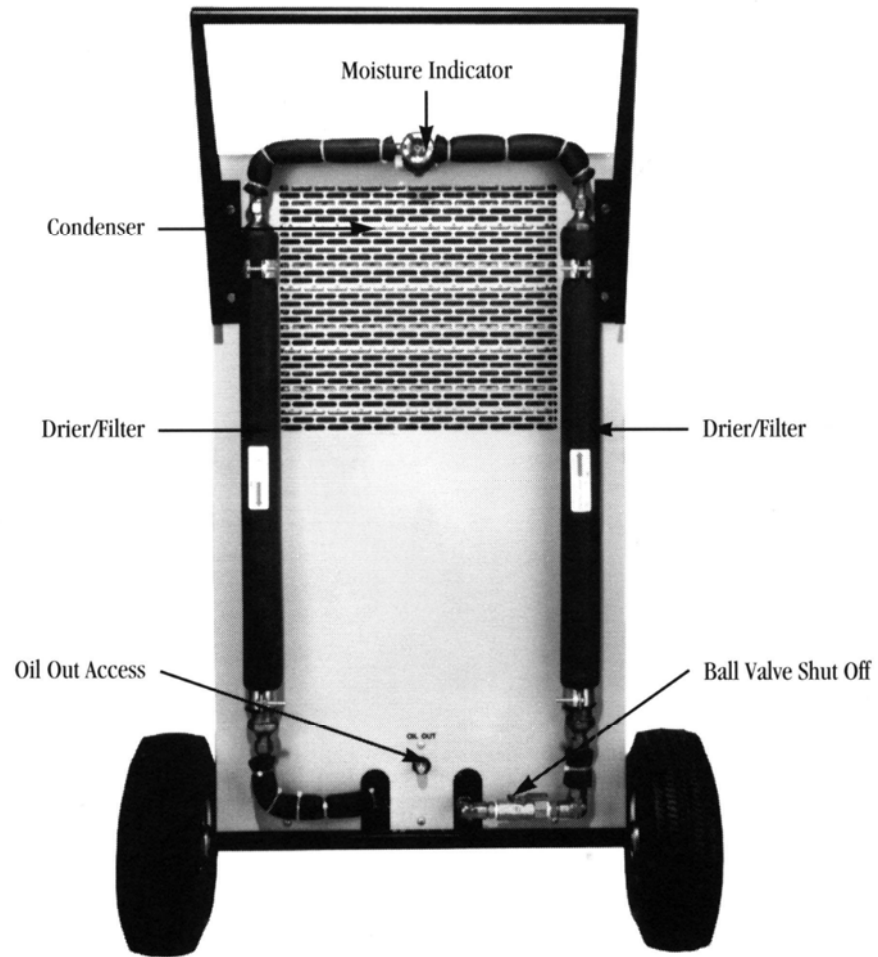
1. Locate the Access Valve fitting in the compressor suction line.
2. Install the supplied Access Valve to this fitting.
3. Hold momentary compressor switch (right hand side) down until a small vacuum is indicated on SUCTION GAUGE (VAPOR switch must be OFF).
4. Suck oil into compressor suction line using Access tool. Watch sight glass for level. Proper level is indicated when oil is visible in the LOWER LEVEL of sight glass. **DO NOT OVERFILL.**



## **Changing the Drier/Filter**

**NOTE:** Drier/filter assembly is located on the rear panel of the unit. It consists of two 24” “towers” hooked in series.

1. Turn the compressor and chill switches ON.
2. CLOSE the ball valve at the bottom of the filter and turn chiller switch on. Allow the unit to pump down and shut off. TURN COMPRESSOR AND CHILL SWITCHES OFF.
3. Loosen 3/8” Flare nuts on the top of filters and remove sight glass assembly.
4. Using a 1 3/8” wrench, loosen and remove filters from lower fittings. DO NOT LOOSEN ELBOWS OR VALVE FITTINGS.
5. Loosen retainer clamps on filters. Remove expended filters.
6. Replace filters. NOTE PROPER FLOW DIRECTION.
7. Reattach and secure top fitting.
8. Reattach and secure filters to lower fittings.
9. Open ball valve at bottom and CHECK FOR LEAKS.
10. Turn compressor and chill switches ON. Run in the chill mode for approx. 5 minutes before returning to operation.



# TROUBLESHOOTING

## Problem

Unit won't accept Refrigerant

## Solution

1. Check to assure INLET hand valve is open.
2. Check operation of FLOAT VALVE SAFETY SWITCH.
3. Unit is plugged in.

System "pulls slowly"

1. Check to assure you are hooked in to liquid side of source.
2. Low ambient temperature. Apply heat to source.
3. Check hoses for detents, small orifices etc.
4. Connecting hose to source too long.
5. Filters need to be changed.

Refrigerant won't Transfer

1. Run in CHILL mode for minimum of 10 minutes (See **Chiller**) before starting Operation.
2. Reclaim system doesn't have enough refrigerant in it.

**HINT:** Hook hose from INLET to vapor side of Cylinder. Run Reclaimer for a period of time pulling on vapor side of cylinder. This will cool the cylinder and lower the head pressure. Re-hook OUTLET to vapor side of cylinder and pump.

Not sure which

Place thermometer on top of machine overnight

refrigerant is in the machine

to record ambient temperature. Check pressure on Head Pressure Gauge and consult your TEMPERATURE PRESSURE CHART.

Oil in lines

OIL OUT operation has not been completed on a Regular basis. Separator chamber is full and oil has migrated through system. Complete OIL OUT operation and run several loads through machine to clean system.

Unit "Short Cycles"

Not enough refrigerant in machine.

## Parts List/CV Series

<b>Number</b>	<b>Description</b>
16-007	Air Condenser
09-119	Air Out/Compressor Momentary Switch
09-079	Capacitor Assembly
24-003	Casters – no brakes
24-004	Casters – with brakes
09-036	Chiller Toggle Switch
15-075	Compressor-115V, 60Hz, 1Ph, 1Hp (Copeland)
15-077	Compressor-208V, 60Hz, 1 Ph, 1Hp (Copeland)
15-076	Compressor-220/240V, 50Hz, 1 Ph, 1 Hp (Copeland)
22-002	Compressor Oil Sight Glass
09-118	Compressor On/Off Toggle Switch
09-136	Crankcase Heater – 115V
26-001	Drier Filter Tower (each)
12-019	Expansion Valve – R-12/R-134a
12-021	Expansion Valve – R-22/R-407c
12-018	Expansion Valve – R-500
12-020	Expansion Valve – R-502/R-404A
09-053	Fan Motor – 230V
09-100	Fan Motor – 115V
22-004	Float Switch Assembly
09-113	Full Light
10-004	Head Pressure Gauge
17-003	High Pressure Control
12-008	High Pressure Relief Valve
09-155	Hour Meter
12-034	Liquid Injection Valve
17-002	Low Pressure Control
22-007	Moisture Indicator (Filter Assembly)
12-005	Oil Access Valve
16-008	Oil Separator
12-035	Refrigerant In/Out Ball Valve (1/4")
09-058	Refrigerant Selector Knob
09-031	Refrigerant Selector Switch Assembly
22-001	Refrigerant Sight Glass
12-009	Solenoid
12-032	Solenoid, Air Out (XVF)
12-010	Solenoid Coil – 120V
12-026	Solenoid Coil – 230V
10-003	Suction Pressure Gauge
10-005	Temperature Gauge
09-036	Vapor/Oil Out Toggle Switch

# Specifications

## Series CV

### **Dimensions**

W - 28 in. / 71.1 cm

D - 24 in. / 61.0 cm

H - 45 in. / 114.3 cm

### **Weight**

223 lbs. / 101kg (approx.)

### **Compressor**

One horsepower Hermetic

### **Refrigerants**

**R-12**, R-134a, R-401B, R-401A,  
R-409A, **R-22**, R-407C, R-411A,  
R-411B, **R-502**, R-404A, R-402A,  
R-402B, R-408A, **R-500**, R412A . . .

*and more*

### **Reclaim Capacity**

3 lbs. / 1.4 kg liquid per minute  
vapor slightly less

### **Electrical**

115/120, 60Hz, 1Ph

Alternate Voltage available upon request

International Voltage available upon request

### **Storage Capacity**

15 lbs. / 7 kg

### **Pressure Gauges**

laboratory quality

### **In/Out Valves**

1/4in. / 6.3 mm SAE male flares

### **Casters**

3 in. / 7.6 cm heavy duty ball bearing

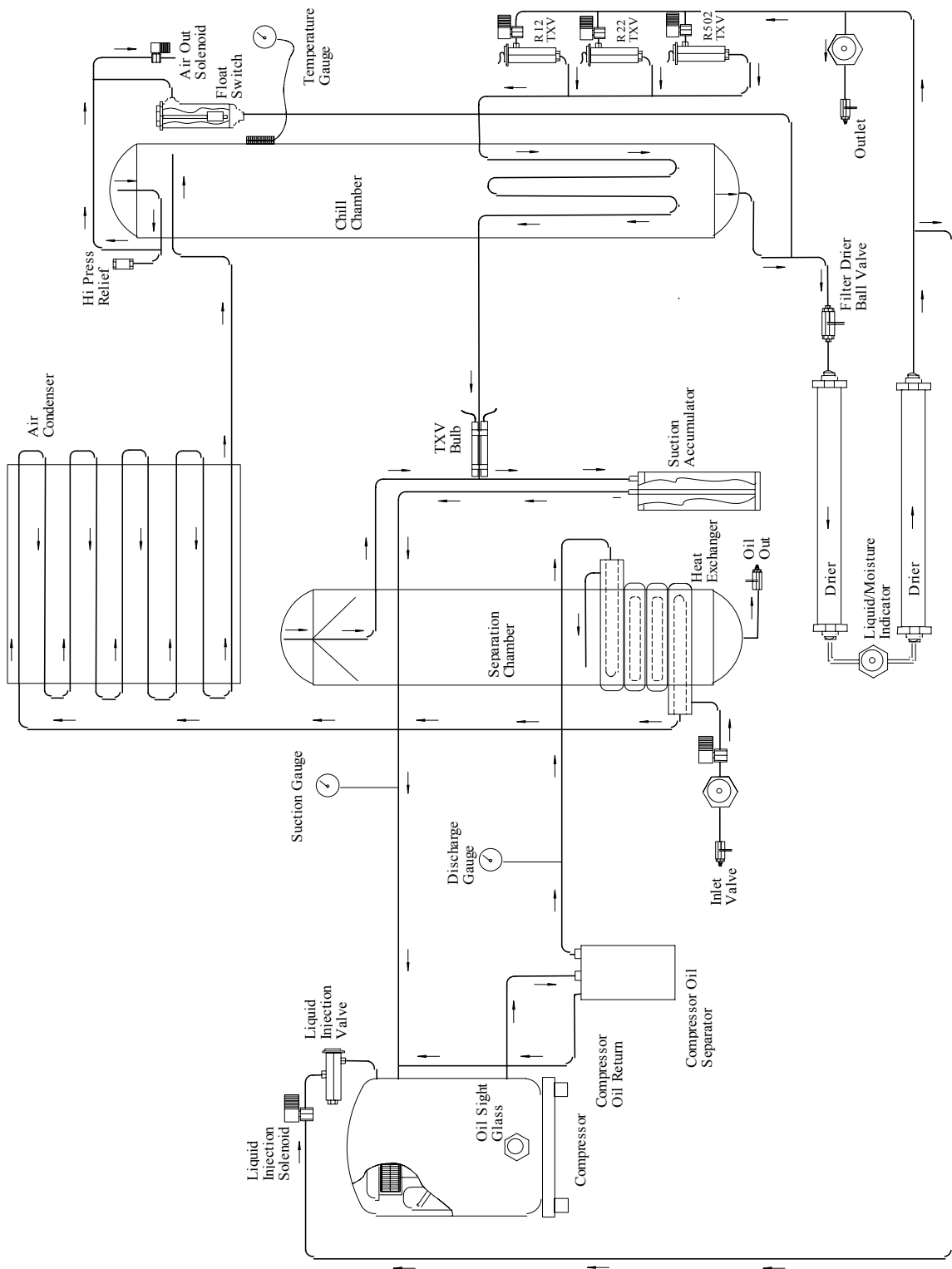
10 in. / 25.4 cm wheels on back

**CV-15A** Design certified by Underwriters Laboratories, Inc.  
 In accordance with ARI-740 1993 for the tabulated characteristics.

ARI-740 1993 Characteristics	Refrigerants				
	12	22	134a	500	502
Vapor Refrigerant Recovery Rate (VRR)	1.0	1.0	1.2	1.2	1.4
Liquid Refrigerant Recovery Rate (LRR)	2.3	1.7	2.2	1.4	1.9
Final Recovery Vacuum (FRV)-in Hg.	15	15	15	15	15
Recycle Rate (RR)	.95	.95	1.29	.95	1.29

ARI-740 1993 Contaminant Levels	Refrigerants				
	12	22	134a	500	502
Moisture Content-ppm	3.6	13.1	7.0	3.6	6.5
Chloride Ions	Pass	Pass	Pass	Pass	Pass
Acidity-ppm	<0.1	0.03	<0.1	<0.1	<0.1
High Boiling Residue-% by Volume	0.005	.008	<.01	0.005	0.005
Particulates/Solid	Pass	Pass	Pass	Pass	Pass
Non Condensables-% By Volume	0.1	0.29	<.05	0.28	0.18

UL 1963 Purge Loss/Non Condensables – less than 5% by weight



120/1/60

