O P E R A T I N G M A N U A L



Vortex® Dual

Refrigerant Recovery Machine

INFICON

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Thank you for buying the INFICON® Vortex® Dual Refrigerant Recovery Machine! For optimal Vortex Dual performance, read this manual carefully before use.

For additional questions or assistance, contact INFICON, +1.800.344.3304 or service.tools@inficon.com.

Safety First!

 This symbol is intended to alert the presence of critical items regarding operating, safety and maintenance (servicing) instructions in this manual.

EPA Certification

INFICON Vortex Dual is an EPA Certified machine in accordance with Section 608 of the Clean Air Act. It has been independently tested and certified to conform with ARI standard 740-1998 by Intertek.

Product Safety

Vortex Dual is a recovery machine for a broad range of refrigerants. Recovering refrigerants into separate storage tanks involves a process of gas compression, resulting in high pressures within the machine, the connecting hoses, and the storage tank.

 High pressure systems can cause accident or injury if not handled properly, and with care.

Refrigerant hoses must have shut-off devices within 30.5 cm (12 in.) of the ends, to reduce the likelihood of refrigerant leakage to the atmosphere when changing tanks or setups.

Responsibility

 Do not use Vortex Dual unless properly trained in the recovery process. Operation of this machine by unqualified personnel is potentially dangerous.

Trademarks

The trademarks of the products mentioned in this manual are held by the companies that produce them.

INFICON®, Vortex®, Compass®, D-TEK® Select, TEK-Mate®, and Wey-TEK™ are trademarks of INFICON.

All other brand and product names are trademarks or registered trademarks of their respective companies.

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1.0 Safety Precautions

Read this manual before using Vortex Dual to become familiar with its specifications and operation. Review the Material Safety Data Sheets (MSDS) and the Temperature - Vapor Pressure information for the proper safety and handling requirements regarding the refrigerants being recovered.

 Wear gloves, eye protection and foot protection when working on refrigeration systems.

 *Refrigerant vapor can be hazardous and its by products can be lethal*.

 *Motors and switches can generate sparks and can be especially dangerous in flammable environments.* Work only in well-ventilated areas, with mechanical ventilation that provides at least four air change rates per hour. Do not work in an enclosed area without appropriate safety equipment. It may be necessary to install a separate circulation fan.

 *Never use oxygen for leak detection. Oxygen can become an explosive mixture in the presence of oil and pressure.* Perform leak detection in accordance with recommended practice only. For best results, use a refrigerant detector, such as INFICON D-TEK Select, Compass, or TEK-Mate.

 *Never mix refrigerants.* Use separate storage cylinders, hoses, and filters for each type of refrigerant recovered. Store refrigerants in a cool, dry place.

 *Never overfill a storage container. Overfilled tanks can rupture and explode.* Use a refrigerant scale such as INFICON Wey-TEK to prevent overfill.

 When opening service or cylinder valves, do so slowly, to ensure all connections are secure and free of danger.

 Disconnect power before moving or servicing Vortex Dual.

 The risk of electric shock and exposure to hot compressor parts is possible if the Vortex Dual covers are removed. Vortex Dual should only be opened by a qualified technician who has been trained in basic electronics and refrigeration.

 Use only the power cord supplied by INFICON. The cord must be no longer than 6 ft, only 3 wire, size 14 AWG or larger. If the cord is lost or damaged, contact INFICON for information on obtaining a replacement.

When connected to Vortex Dual, extension cord wiring can overheat under conditions of high current draw. If an extension cord is necessary, use only size 14 AWG or larger, with the shortest possible length.

Do not use Vortex Dual near open containers of gasoline or other flammable liquids.

2.0 Specifications, Features and Warranty

2.1 Vortex Dual Specifications

Refrigerants . . . . . EPA Certified to ARI 740-1998 for R-134a, R-22, R407, R410A, and all refrigerants listed under categories III, IV, & V in ARI standard 740-1998

Power. . . . . 115 V (ac), 60 Hz, 10 A, or 230 V (ac), 50 Hz, 4 A (depending on version)

Protection . . . . . High pressure switch cutoff at 550 PSI Compressor motor thermally protected

Pressure . . . . . Low side design pressure 240 PSI; High side design pressure 550 PSI

Temperature . . . . . Operating range 10 to 40°C (50 to 104°F)

2.2 Warranty

INFICON warrants the Vortex Dual Refrigerant Recovery Machine to be free from defects of materials or workmanship for three years from the date of purchase. INFICON does not warrant any machine that has been subjected to misuse, negligence, or accident, or has been repaired or altered by anyone other than INFICON.

The compressor is warranted for a period of three years by the manufacturer. To keep this warranty in force, a filter (included) must be used on the inlet port or hose at all times to prevent particulates from entering the compressor. *Failure to use the included filter will void the compressor warranty.*

INFICON liability is limited to repairing or replacing, at its option, a defective machine or part. If a defect arises, a valid claim must be received by INFICON, with transportation prepaid, no later than thirty (30) days after the warranty period expires. INFICON will determine whether the machine has malfunctioned due to defective materials or workmanship.

This warranty is in lieu of all other warranties, expressed or implied, whether of merchantability, fitness for a particular purpose, or otherwise. All such other warranties are expressly disclaimed.

INFICON shall have no liability in excess of the price paid to INFICON for Vortex Dual, plus return transportation charges prepaid. INFICON shall have no liability for any incidental or consequential damages. All such liabilities are excluded.

3.0 Setup and Operation

3.1 Getting Started

Review the full contents of this manual before operating Vortex Dual.

Failure to follow proper safety precautions can result in personal injury or death. Do not use Vortex Dual unless properly trained in the recovery process.

1. Install the included filter on the inlet. Vortex Dual has a female refrigerant flare fitting, and connects with male flare fittings.
2. Attach the hoses to the filter.

Do not use an adapter fitting in place of a filter. Use of an adapter fitting can damage the valves and will void the warranty.

3. Attach a hose from the discharge valve to the recovery tank. Connect other hoses between system components, according to Figure 1 on page 7.
4. Connect the AC power cord to a circuit protected by a 15 amp breaker. If an extension cord is absolutely necessary, make sure it meets the following conditions:
   - length is not excessive
   - contains a safety ground wire
   - wire size 14 AWG, or greater

Overfilled tanks can rupture and explode. When operating in standard recovery or push-pull mode, it is possible to overfill the tank. Use a refrigerant scale to ensure that the tank does not exceed 80% of its capacity, by weight. Check the tank weight before transporting.

Do not allow Vortex Dual to recover large amounts of liquid too quickly.

NOTE: When a significant amount of liquid is present and enters the recovery machine too quickly during the refrigerant recovery process, this is sometimes referred to in the field as a "liquid slug" or "slugging."

A liquid slug can activate the High Pressure shutoff and prolong the refrigerant recovery process. If Vortex Dual recovers large amounts of liquid too quickly (or a liquid slug is present), a loud knocking will sound from the compressor.

Compressor damage caused by recovering a large amount of liquid too quickly is not covered by the compressor warranty.

Monitor the recovery process carefully. If the compressor begins to knock:

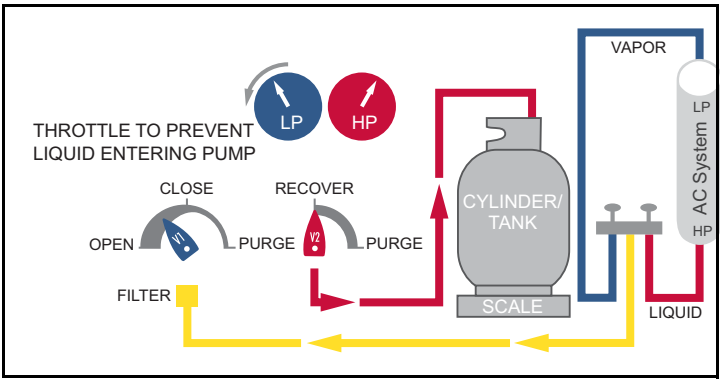
- throttle the **INLET** valve clockwise, or
- adjust the **MANIFOLD** gauge valves until the knocking stops.

3.2 Standard Recovery Operation

1 Connect all cables and hoses as described in section 3.1.

NOTE: Make sure all connections are tight, and that the cables and hoses do not interfere with recovery process. See Figure 1.

Figure 1 Setup procedure for standard refrigerant recovery



2 Make sure the hose connecting Vortex Dual to the recovery tank is attached to the **LIQUID** port (**LP**).

3 **OPEN** the **LP** valve on the tank. Keep the **VAPOR** port **CLOSED**.

4 Rotate the INLET valve (**V1**) to **CLOSE**.

5 Set the PURGE/RECOVER valve (**V2**) to the **RECOVER** position.

6 Slowly rotate the **LIQUID** valve on the MANIFOLD gauge set to **OPEN**. Make sure there are no leaks.

7 Turn on Vortex Dual.

8 Monitor the inlet pressure (**LP**, Low Pressure gauge) and *slowly* rotate the INLET valve (**V1**) to **OPEN**.



The compressor may emit a knocking sound if Vortex Dual attempts to recover a significant amount of liquid. To prevent damage to the compressor, throttle the **LIQUID** valve on the MANIFOLD gauge set, or the Vortex Dual INLET valve (**V1**).

9 Once the liquid has been recovered, transfer the remaining vapor; rotate the INLET valve (**V1**) to **OPEN**. Make sure the **LIQUID** and **VAPOR** valves on the MANIFOLD gauge are **OPEN**.

10 Continue to operate until the **LP** guage indicates the required vacuum has been obtained.

11 Turn off Vortex Dual and close the INLET valve (**V1**). Wait five minutes.

If the MANIFOLD gauge indicates pressure has risen above **0 PSIG**, refrigerant is still present.

- Open the INLET valve (**V1**) and turn on Vortex Dual.
- Run Vortex Dual until the required vacuum is reached again.
- Wait five minutes. Repeat this process until all refrigerant is removed and pressure is **0 PSIG**, or less.

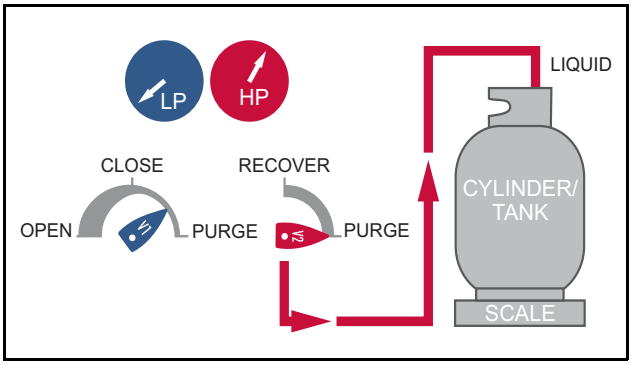
12 Immediately purge Vortex Dual. Purging is necessary to remove any residual refrigerant from inside Vortex Dual internal components as well as the hose from the outlet to the recovery tank. See section 3.3.

3.3 Purging Vortex Dual

1. While Vortex Dual is off, rotate the PURGE/RECOVER valve (**V2**) to **PURGE**. See Figure 2.
2. Turn on Vortex Dual and *slowly* rotate the INLET valve (**V1**) to **PURGE**.
3. Run Vortex Dual and monitor the LP gauge until a vacuum of **20 In/Hg** or more is achieved.
4. Turn off Vortex Dual and *immediately* close the valves on the recovery tank. Rotate the inlet valve (**V1**) to **CLOSE**.

The hose and the discharge port will contain a small amount of pressurized refrigerant. Exercise care when removing this hose.

Figure 2 Setup procedure for purging



3.4 Push-Pull Operation

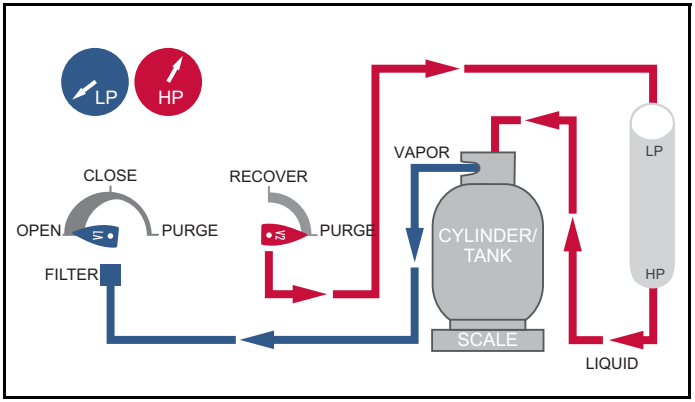
The push-pull recovery method is used to move large amounts of liquid refrigerant. During this process, the recovery unit pulls vapor from the recovery cylinder and produces high pressure discharge gas that pushes liquid out of the HVAC system and back into the recovery cylinder. Recovery rates above 15 pounds per minute can be achieved when using this procedure.

NOTE: Do not attempt the push-pull process unless the system contains at least 15 pounds of liquid that can easily be isolated.

To prevent overfill, use the scale to make sure the tank does not surpass 80% capacity, by weight. Monitor the tank weight carefully as 80% capacity maybe reached quickly during push-pull due to its rapid transfer.

Connect the refrigerant hoses (see Figure 3). A sight glass, not included, can help determine when the liquid has been transferred and vapor remains.

Figure 3 Setup procedure for push-pull method



3.5 Cooling The Recovery Tank

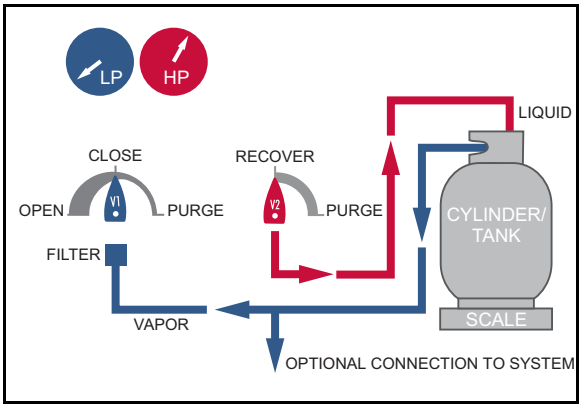
Vortex Dual can be used to pre-cool (or sub-cool) the recovery tank, if the head pressure is too high to complete the recovery process. If the ambient pressure is too high, high head pressure can occur when working with certain refrigerants that have a high vapor pressure.

NOTE: The recovery tank must contain five pounds or more of liquid, to allow the pressure differential to develop.

Sub-cooling the tank before starting the recovery process may provide little or no benefit.

If the recovery process stalls because of high head pressure, turn off Vortex Dual, close the hose valves, and reconfigure the setup as shown in Figure 4.

Figure 4 Setup procedure for sub-cooling method



1. Rotate **V2** on the Vortex Dual to RECOVER and open the **LIQUID** and **VAPOR** valves on the cylinder.
2. Turn on Vortex Dual.
3. Rotate **V1** on Vortex Dual to OPEN.
4. On the cylinder, throttle the flow of liquid by slowly closing the **LIQUID** valve to achieve a minimum pressure differential of **100 PSIG** between the LP and the HP gauges.

   NOTE: To prevent the HP cutoff switch from actuating, do not allow the HP gauge to exceed **550 PSIG**.
5. Once the recovery tank is cold, turn off Vortex Dual and reconfigure the setup for standard recovery. Repeat as needed.

3.6 Special Operating Notes

During standard operation, the High Pressure switch will reset when the head pressure drops below approximately 425 PSI, and Vortex Dual will restart automatically.

4.0 Maintenance

With minimal but important maintenance, Vortex Dual can provide many seasons of reliable service. After each use, clean Vortex Dual with a damp cloth to remove dirt and oils.

 Do not use gasoline or other hazardous solvents to clean Vortex Dual; this can damage the plastic enclosure. Standard household detergent or isopropyl alcohol may be used, but do not allow liquid to penetrate the outer case.

Make sure the inlet and discharge ports are protected during transit and storage; keep the inner diameter and the outer threads clear and clean.

NOTE: For best results, leave the filter connected to the inlet port, and change the filter regularly.

5.0 Troubleshooting

PROBLEM	CAUSE	ACTION
Vortex Dual will not turn on; compressor does not start	1. Power cord is not attached 2. No voltage at receptacle 3. Circuit breaker has opened 4. Discharge pressure is too high; HP switch has opened 5. Electronics failure in motor	1. Attach power cord 2. Verify voltage at job site 3. Identify cause of breaker activation, rectify and reset 4. Reduce pressure; rotate **V2** to **Purge**, then back to **Recovery** 5. Factory service required
Compressor starts, but falters within minutes; pressure indication on HP gauge is high	1. Recovery tank valve is not open 2. Discharge hose blocked 3. Air in system/tank	1. Open tank valve 2. Check and clear blockage 3. Bleed air from system/tank

PROBLEM	CAUSE	ACTION
Compressor stops intermittently	1. Vapor pressure of refrigerant in tank is close to HP trip point 2. Thermal overload switch in compressor is activating	1. Reduce tank temperature 2. Reduce amount of liquid being pumped; let machine cool before proceeding
Vortex Dual overheats	Excessive head pressure, due to: 1. High ambient temperature 2. Restricted discharge hose 3. Air in recovery tank	1. Reduce tank temperature 2. Check and clear restriction 3. Bleed air from tank
Recovery process too slow	1. Head pressure is too high 2. System refrigerant is frozen 3. Compressor seals are worn	1. Reduce tank temperature or change tanks 2. Interrupt process to allow ice to dissipate 3. Rebuild compressor with service kit — contact wholesaler for assistance

6.0 Service

Vortex Dual uses only UL recognized electrical components, or components that have been specially designed for this application.

Do not change any of these components, as it could compromise safety. All service work must be performed at an INFICON-approved facility to maintain the safety rating and the warranty.

If defective, do not return Vortex Dual directly to the factory. For technical assistance or service information, contact INFICON or your wholesaler.

7.0 EPA Requirements

Under Section 608 of the Clean Air Act (40 CFR Part 82), the Environmental Protection Agency (EPA) has established regulations that cover all aspects of the refrigerant recovery process.

These regulations have established service practices that maximize the recycling of ozone-depleting compounds during the servicing and disposal of air-conditioning and refrigeration equipment.

Certification requirements for recovery equipment and technicians have also been established. The INFICON Vortex Dual has been EPA Certified for use by an independent laboratory.

The EPA has also established Evacuation Requirements for HVAC/R equipment used for service, to ensure that any release of CFCs or HCFCs to the atmosphere is minimized.

- Technicians repairing small appliances such as household refrigerators, window air conditioners and water coolers, must recover 80% of the refrigerant when the compressor in the appliance is not operating.
- Technicians repairing small appliances must recover 90% of the refrigerant when the compressor in the appliance is operating.

NOTE: These requirements may also be met by evacuating the small appliance with the recovery machine to four inches of mercury vacuum.

Other requirements are covered in Table 7-1 on page 15.

Table 7-1 EPA Requirements

TYPE OF APPLIANCE	REQUIRED INCHES OF HG VACUUM
HCFC-22 appliance generally containing less than 200 pounds of refrigerant	0
HCFC-22 appliance generally containing 200 pounds or more or refrigerant	10
Other high pressure appliance generally containing less than 200 pounds of refrigerant	10
Other high pressure appliance generally containing 200 pounds or more of refrigerant	15
Very high pressure appliance (CFC-13, -503)	0
Low Pressure appliance (CFC-11, HCFC-123)	1

The EPA requires that service technicians certify the acquired recovery equipment to the appropriate EPA Regional Office, and that it is in compliance with the applicable laws established by the Clean Air Act. Forms are available from the Regional Office of the EPA.

Questions about the EPA requirements can be answered by contacting the Ozone Protection Hotline, toll free, at +1.800.296.1996.



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