

REFRIGERANT RECOVERY PACKAGE



INSTALLATION AND OPERATING GUIDE



CONTENT

UNITORTM
by Wilhelmsen

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1. OVERVIEW

The refrigerant recovery package is available in 2 variants, 220 V (product no. 652522) and 110 V (product no. 652511).

The package consists of carefully selected quality equipment, tool and accessories as follow:



**Inlet filter drier
3pcs, 1/4" flare**

Product number:
636738



**Maintenance kit
leak detector-XP2**

Product number:
548700



**Recovery cyl empty
21.6l + documents**

Product number:
596544



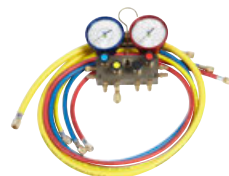
**Vacuum pump 115 /
230 V UVP1550-A3**

Product number:
587660



**Digital weighing
platform ADS-100**

Product number:
613927



**Deluxe manifold
set 4-way**

Product number:
711473



**Refrigerant cyl.
valve Adaptor set**

Product number:
544932



**Refrigerant Leak
Detector UNIRX-1A**

Product number:
716142



**Digital vacuum
gauge UVG-80**

Product number:
711509



**Refrigerant recovery
unit URU-5000A /
URU-5000B**

Product number:
613748 / 613747



2. REFRIGERANT RECOVERY UNIT 613748 URU-5000A / 613747 URU-5000B



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The safe way is the only way:

i NOTE: If you are not a qualified refrigerant service technician, do not use this equipment

1. The technician should always wear goggles and gloves when working on refrigeration systems.
2. Be sure that any room where you are working is thoroughly ventilated,
3. Always think before acting. Familiarity breeds carelessness and carelessness can be harmful to your health or, worse, result in death.
4. Read the Material Safety Data Sheets (MSDS) on all compounds with which you are likely to come in contact. Read MSDS on refrigerant and refrigerant oil. Obtain MSDS sheets from your refrigerant supplier.
5. Never use oxygen when testing for leaks. Any oil in contact with oxygen under pressure will form an explosive mixture.
6. Refrigerant systems are generally electrically driven and controlled. Be sure to disconnect the unit from the power source before servicing it.
7. Always store refrigerant containers in a cool, dry place.
8. Always open service and cylinder valves slowly. This allows quick control of the flow of gasses if there is any danger. Once it is determined that there is no danger, the valves may be opened fully.
9. Do not mix refrigerant in a system, a tank or anywhere else. Each type of refrigerant must have its own tank, filters, etc.

10. If moisture enters the refrigerant system, it is likely to cause considerable damage. Keep everything connected with the refrigeration system thoroughly dry and clean.
11. To reduce the risk of fire, avoid the use of extension cords as they may overheat. If you must use an extension cord it should be a minimum of 14 AWG and not longer than 25 ft. This equipment should be used in locations with mechanical ventilation providing at least four air changes per hour, or the equipment should be located at least 45 cm (18") above the floor. Do not use this equipment in the vicinity of spilled or open containers of gasoline or any other flammable liquid.

Refrigerant gas recovery & containment:

Safety comes first. Read all safety information for the safe handling of refrigerant including the Material Safety Data Sheet provided by your refrigerant supplier. Never operate unit in an explosive environment. Wear safety glasses and protective gloves. Work area must be well ventilated. This unit should only be operated by a qualified technician.

CAUTION:



Refrigerant Store Containers Use only approved cylinders with a minimum of 41 bar working pressure that serve the current regulations.



i NOTE: Recovery cylinders are designed for different pressures. Do not exceed the working pressure of each cylinder.

Safety codes recommend that closed tanks not be filled over 80 % of volume

with liquid. The remaining 20 % is called head pressure room.

⚠ Never transport an overfilled cylinder.

Refrigerant expands when it gets warm and may cause a tank to explode if overfilled.

Cylinder temp.

16 °C

21 °C

38 °C

54 °C

66 °C

starting with
cylinder 80 %
full by volume



**space occupied
by liquid**

80 %

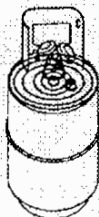
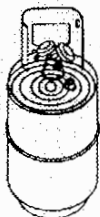
81 %

83 %

90 %

94 %

starting with
cylinder 90 %
full by volume



**space occupied
by liquid**

90 %

92 %

96 %

100 %

Important general information:

Before operating the URU-5000 (RG5410A-E) recovery unit, read the following:

1. Always isolate large amounts of refrigerant and close off valves after use so if a leak should develop anywhere in the system the refrigerant does not escape.

2. Storage cylinders sometimes have valves that are not properly seated when manufactured. Keeping caps on these valves will guard against refrigerant leakage.

3. Always operate the unit on a flat level surface.

4. Your URU5000 (RG5410A-E) has one internal pressure shut off switch. If the pressure inside the system should go above 38,5 bar (550 psi), the system will automatically shut itself off.
10. Always empty refrigerant from the unit into a storage tank; see Self Purge / Auto Evacuate procedure. Liquid refrigerant left in the condenser may expand, causing damage to components.

CAUTION:

 **The 38,5 bar (550 psi) switch does not prevent tank overfill. If your system shuts off on high pressure and is connected to your tank, you may have overfilled your tank and created a VERY DANGEROUS SITUATION! Take immediate measures to relieve any high pressure and/or tank overfill.**

5. **WARNING!** Never overfill storage tanks. Overfilling may cause tanks to explode.
6. A scale must be used to avoid overfilling the storage tank.
7. Tanks and filters should be designated for one refrigerant only. Before using a tank previously used for another refrigerant, completely empty the tank, evacuate it, purge the tank using dry nitrogen, and re-evacuate it.
8. Special care should be taken when recovering from a burned-out system. Use two high acid capacity filters, in series. Alco type EK-162-F or Sporlan type C-162-F are recommended.
9. When you have finished recovering from the system, flush your URU5000 (RG5410A-E) with a small amount of refrigerant oil and a small amount of clean refrigerant to purge off any foreign substances left in the unit.

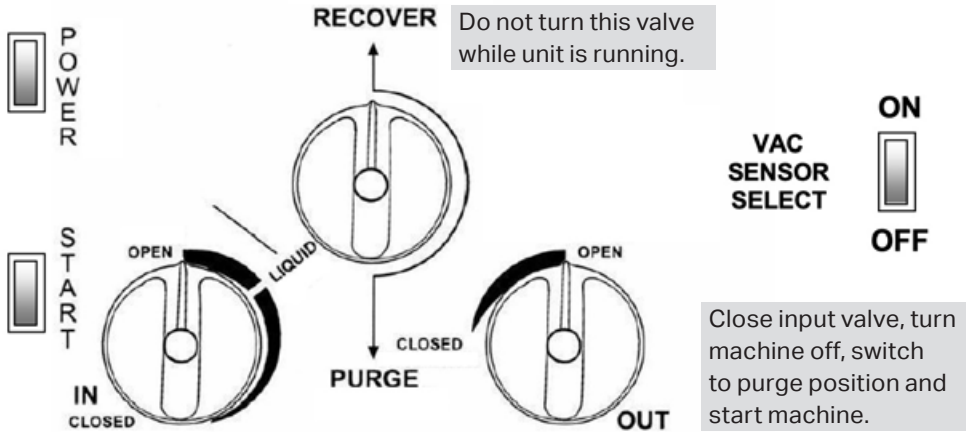
Operating your unit:

Connect your URU5000 (RG5410A-E) to a 230 V outlet. Switch the main power switch to the ON position. You should hear the fan running. Press the compressor start switch. This "momentary" switch will start the compressor. It may be necessary, under certain circumstances, to press this switch more than once to start the compressor.

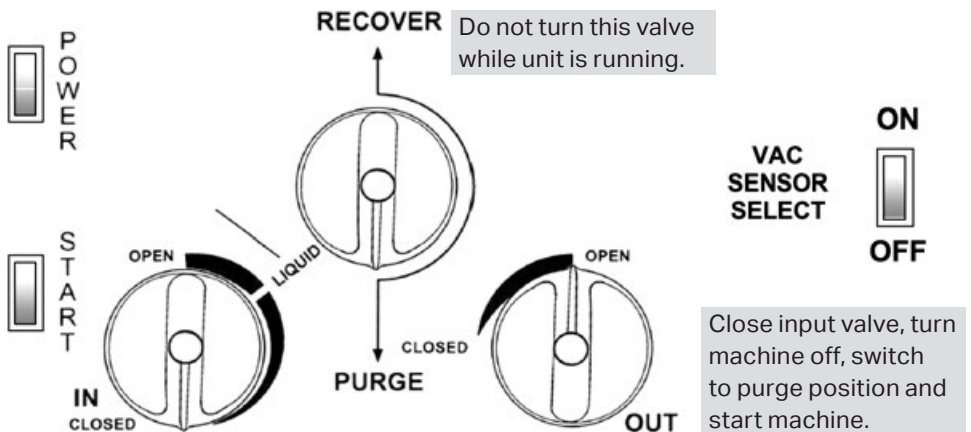


Operational procedures:

Normal recovery



Self purge / auto evacuate



NOTE: To change from recovery mode to purge: Close the input port, turn the unit off (to prevent high pressure shutoff), switch to purge position and restart the unit.

Operating your unit:

Procedure for Normal System Recovery

1. Inspect the URU-5000 (RG5410A-E) thoroughly to ensure it is in good condition.
2. Make sure all connections are correct and tight.
3. Open the liquid port of the recovery cylinder (always open valves slowly to check hoses and connections for leaks).
4. Make sure the recover/purge valve is set on recover.
5. Open the output port of the URU-5000 (RG5410A-E).
6. Open the liquid port on the manifold gauge set; opening the liquid port will remove the liquid from the system first, greatly reducing the recovery time (after the liquid has been removed, open the manifold vapor port to finish evacuating the system).
7. Connect your URU-5000 (RG5410A-E) to a 230 V outlet.
 - a) Switch the main power switch to the ON position. You should hear the fan running.
 - b) Press the compressor start switch. This "momentary" switch will start the compressor (it may be necessary, under certain circumstances, to press this switch more than once to start the compressor).
8. Slowly open the input port on the URU-5000 (RG5410A-E).
 - a) If the compressor starts to knock, slowly throttle back the input valve until the knocking stops.
 - b) If the input valve was throttled back, it should be fully opened once the liquid has been removed from the system (the manifold vapor port should also be opened at this time).
9. Run until minimum EPA required vacuum is achieved. **(See page 21)**
 - a) Close the manifold vapor and liquid ports.
 - b) Close the URU-5000 (RG5410A-E) input port.
 - c) Shut unit off and proceed with the Self Purge procedure on the next page.
10. **Always purge** the URU-5000 (RG5410A-E) after each use. Failure to purge the remaining refrigerant from the URU-5000 (RG5410A-E) could result in the acidic degradation of internal components, ultimately causing premature failure of the unit.

CAUTION:



When pumping liquid, do not allow the URU-5000 (RG5410A-E) to operate with the input valve too far open, causing the compressor to knock.

Doing so may stall the compressor.



Operating your unit:

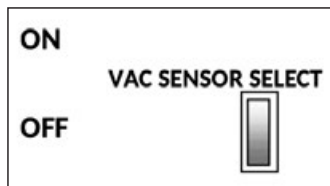
Procedure for purging remaining refrigerant from the URU-5000 (RG5410A-E)

1. Close the ports of the system being serviced that are connected to the input port of the URU5000 (RG5410A-E).
2. Close the input port on the URU5000 (RG5410A-E).
3. Turn off URU5000 (RG5410A-E).
4. Turn the recover / purge valve to the purge position.
5. Restart the URU-5000 (RG5410A-E).
6. Run until desired vacuum is achieved.
7. Close the ports on the recovery tank and the URU-5000 (RG5410A-E).
8. Turn the URU-5000 (RG5410A-E) off.
9. Return the recover/purge valve to the recover position.
10. Disconnect and store all hoses.
11. Replace the in-line filter on your URU-5000 (RG5410A-E) after every time excessive contaminant is encountered.

The use of the low pressure switch

The URU-5000 (RG5410A-E) is equipped with a low pressure switch which is selectable ON/OFF (VAC SENSOR SELECT). When the low pressure switch is switched ON the unit will automatically switch off at 0,45 bar absolute. When the low pressure switch is switched OFF the unit will conti-

nue to pump down the system even when the vacuum stage has been reached.



Refrigerant recovery additional information

To achieve the deepest final vacuum, use the tank cooling method to lower the head pressure on the recovery tank. Repeat as necessary to achieve the desired vacuum level.

 NOTE: If there is no liquid in the recovery tank, then the cooling method will not work. In this case, use an empty tank that has been fully evacuated to achieve the final vacuum level required.

To maximize recovery rates use the shortest possible length of 3/8" or larger hose. A hose no longer than 3'0" is recommend. Always remove all unnecessary hose core depressors and Schrader valves from port connections (using the proper valve core tool) for maximum throughput. Deformed rubber seals and core depressors in hoses and faulty or unnecessary Schrader valves can restrict flow by up to 90 %.

If the tank pressure exceeds 31,5 bar, use the tank cooling procedure to reduce the tank pressure. When recovering large amounts of liquid, use the "PUSH/PULL" method of recovery (see diagram below).

CAUTION:

 When using the "PUSH / PULL" method, you must use a scale to prevent overfilling the storage tank. Once the "PUSH / PULL" siphon is started, it can continue and overfill the storage tank even if the tank is equipped with a float level sensor.

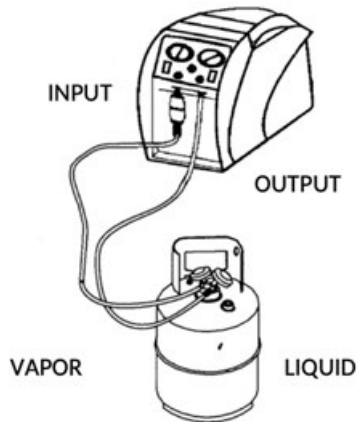
The siphon can continue even when the machine is turned off. You must manually close the valves on the tank and the unit to prevent overfilling the recovery tank.

Set-up diagram for tank pre or sub cooling procedure:

To start you must have a minimum of 2,5 kg of liquid refrigerant in the tank.

Throttle the output valve so that the output pressure is 7 bar (100 psi) greater than the input pressure, but never more than 31,5 bar (450 psi).

Run until the tank is cold.

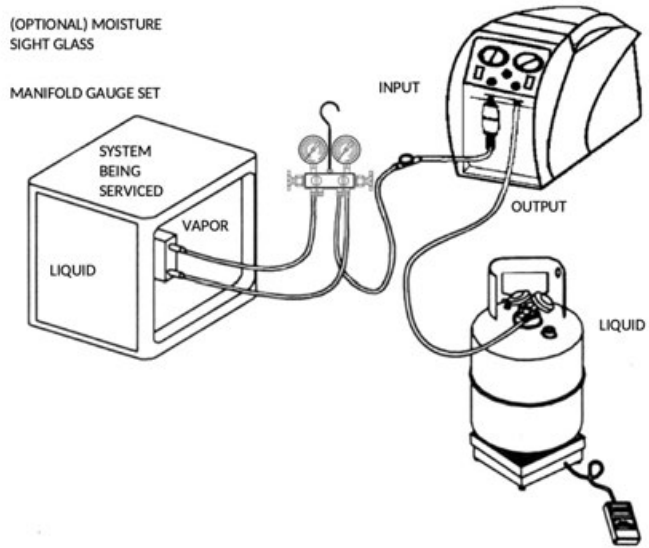




Set-up diagram for refrigerant recovery:

This method is the fastest method for recovering vapor refrigerant.

A scale must be used to avoid overfilling the storage tank.

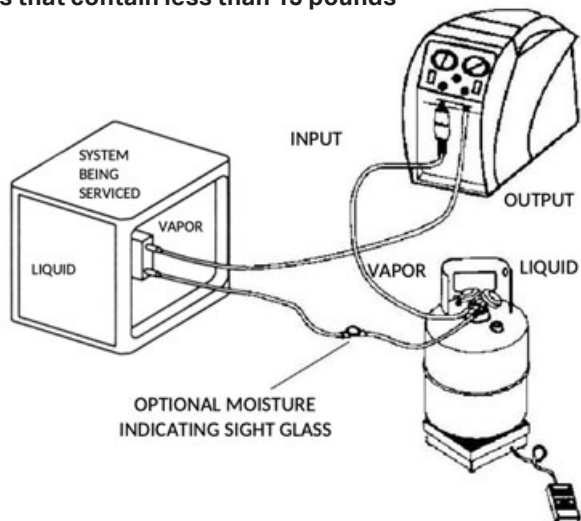


Set-up diagram for "push / pull" method:

Push pull only works with large systems where the liquid is readily accessible. Do not use this method on systems that contain less than 15 pounds

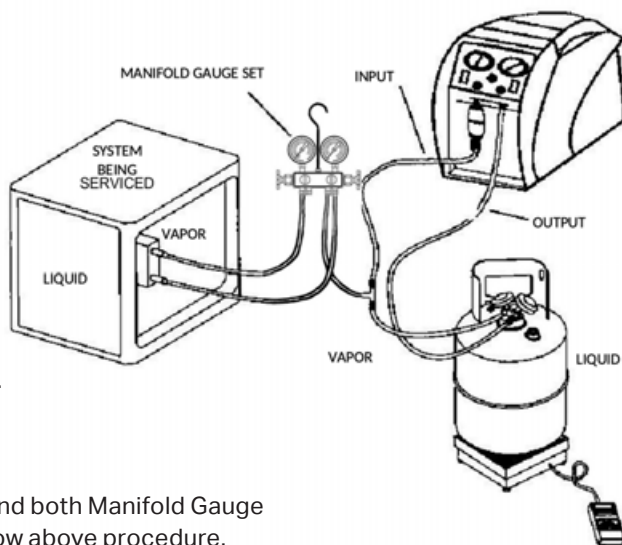
A scale must be used to avoid overfilling the storage tank.

The sight glass is used to provide a method of determining the moisture content and quality of a system's refrigerant.



Optional recovery / tank pre or sub cooling for fixed hose set up:

A scale must be used to avoid overfilling the storage tank.



Normal recovery:

Tank Vapor valve is closed.

Tank pre or sub cooling:

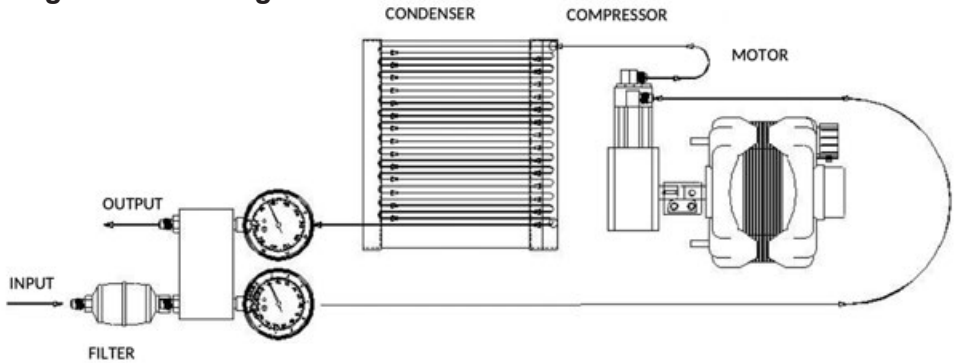
Tank Vapor valve is open and both Manifold Gauge Set valves are closed. Follow above procedure.

Recovery procedure:

Purging the non-condensable gases from identified refrigerant in a tank

1. Allow the tank to sit undisturbed for 24 hours. (This allows the air to rise to the top).
2. Connect a manifold to the tank and read the amount of pressure in the tank by looking at the output pressure gauge.
3. Determine the ambient temperature in the room.
4. Refer to a Refrigerant pressure / temperature chart. Find the temperature on the chart and look across to the corresponding pressure for the type of refrigerant in the tank. Determine how that relates to the reading on the gauge.
5. If the pressure reading is higher than the pressure shown on the chart, very slowly (so as not to cause turbulence inside the tank) crack open the vapor port valve. Watch the pressure on the gauge decrease. To prevent venting, add 0,3 - 0,35 bar (4 - 5 psi) to the pressure shown on the chart. When the gauge corresponds to that pressure, close the vapor port valve.
6. Allow the tank to sit for 10 minutes and check the pressure again.
7. Repeat the process again if necessary.

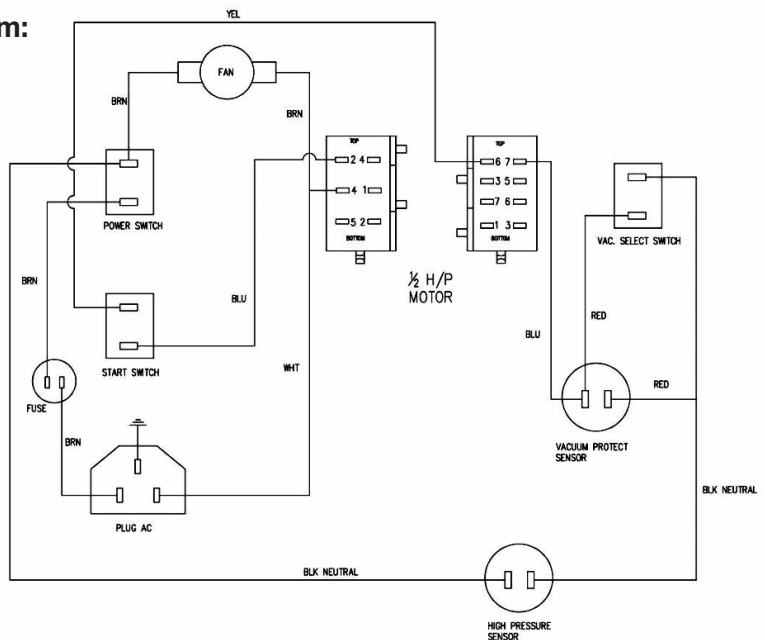
Refrigerant flow diagram:



NOTE: A filter must always be used. Failure to use a filter will invalidate your warranty. The use of a filter will greatly reduce the risk of damage to your URU5000 (RG5410A-E) by preventing foreign material from entering the unit .

Special consideration for filtration must be given when you know you are servicing a machine that has "Burned Out". We recommend the use of two size 162 filter driers, in line, to be used for that job and that job only.

Wiring diagram:



Safety pressure switch (with manual reset function)

The URU5000 (RG5410A-E) is equipped with an internal Safety Pressure Switch. If the pressure inside the system exceeds 38,5 bar, the system is switched off automatically. If the Safety Pressure Switch is activated automatically whilst filling a bottle, it could be caused by the bottle becoming overfilled.

This is a very dangerous situation! You should take steps immediately to reduce the overpressure and / or to eliminate the overfilling of the bottle.

If the Safety Pressure Switch switches the unit off...

The following precautions should be taken if the Safety Pressure Switch is activated:

a. Suspected overfilling of the recovery bottle

Connect the recovery bottle to another bottle with spare capacity so that the pressure is reduced to a safe level. This action should also reduce the pressure in the output line from the URU5000 (RG5410A-E). Proceed as normal after resetting the Safety Pressure Switch (see below).

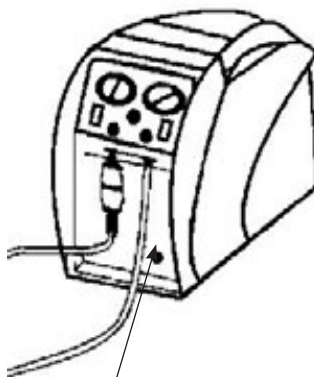
b. Cause of activation of Safety Pressure Switch unknown

1. Check that the recovery bottle is not overfilled.
2. Close the system valves, recovery bottle valves and URU5000 (RG5410A-E) valves.

3. Disconnect URU5000 (RG5410A-E) from flexible pipes.
4. Disconnect URU5000 (RG5410A-E) from the power supply.
5. Open the input and output valves very slowly.
6. Investigate the reason for the failure.

Once activated the Safety Pressure Switch has to be reset manually as follows:

- I. Remove the black protection cover to reveal the reset button (see picture below).
- II. Reset by pushing the reset button with a tool such as a screwdriver.
- III. Replace the cover.



Remove this part in order to reset the pressure switch.



Technical specifications:

Type	URU5000 (RG5410A-E)
Application	Refrigerant Recovery Gas or Vapor
Suitable refrigerants	R12, R1234yf, R1234ze(E), R22, R134a, R32, R401A, R401B, R401C, R402A, R402B, R404A, R406A, R407A, R407B, R407C, R407D, R407F, R408A, R409A, R410A, R411A, R411B, R412A, R417A, R422D, R448A, R449A, R449C, R450A, R452B, R454B, R456A, R500, R502, R507, R509, R513A, R516A
Power Source	230 V 50/60 Hz (URU 5000A) / 115 V 50/60 Hz (URU 5000B)
Power	14,5 kg
Dimensions	330 x 229 x 483 mm
Weight	14,5 kg
Recovery Rate	Vapor: up to 33 kg / h Liquid: up to 80 kg / h Push Pull: up to 380 kg / h
Displacement	8,2 cm ³ (1/2 cubic inch)
RPM´s	1437 U / min
Max. working pressure	550 p.s.i. (38,5 bar)
Fuse	5 x 20, slow, 8 A 250 V
Safety Device	Safety pressure switch type P100 DA with manual reset (550 p.s.i. / 38,5 bar)

ATTENTION:

 **The URU5000 A/B (RG5410A-E) should not be used with inflammable gases nor with gases containing ammonia.**

Care and maintenance of your recovery unit:

A filter must always be used and should be replaced frequently. Failure to use a filter will invalidate your warranty. The use of a filter will greatly reduce the risk of damage to your URU5000 (RG5410A-E) by preven-

ting foreign material from entering the unit.

Special consideration for filtration must be given when you know the machine you are servicing has "burned out". We recommend the use of two size 162 filter driers, in line, to be used for that job and that job only. We also recommend that a clean filter

be used for every service job. Each filter should be labeled and used exclusively for one type of refrigerant only.

Do not use this unit in the vicinity of spilled or open containers of gasoline or other combustible liquids. Avoid the use of extension cords. If you must use an extension cord it should be a minimum of 14 AWG and not longer than 25 ft. Not using an extension cord will greatly reduce the risk of fire. Always purge the unit of any refrigerant left after completing a service job. Refrigerant left in the machine can expand and may cause damage to components. If the unit is to be stored or not used for any length of time, we recommend that it be completely evacuated of any residual refrigerant and purged with dry nitrogen. Whenever you perform any type of maintenance work on your URU5000 (RG5410A-E) ensure that it is disconnected from the power supply before you begin.

Helpful hints for refrigerant recovery:

Refrigerant recovery has come a long way in a few short years.

On the surface it's simply the process of taking refrigerant out of a system and putting it into a tank. However, this simple process can quickly become problematic if a few items are overlooked. The following are some tips and pointers we've accumulated over the last few years that can save you time and make the process go smoother.

First you need to identify the refrigerant type and quantity in the system you are servicing.

If you determine it's a burnout, you need a special tank (a tank that's identified as containing burnout or other unidentified gases), and you need to use extra filtration prior to recovery.

If, on the other hand, you know the gas in the system is relatively clean or new, then a new tank should be used. If you're planning on putting the refrigerant back into the same system after you have finished the service or if the refrigerant is going to be reclaimed, then use a tank that has the same refrigerant in it. A word of caution about the Environmental Protection Agency (EPA): If you use a variety of refrigerant gasses in your service work - as evidenced by your refrigerant purchases - and you only own one tank, you are asking for trouble. You would be well advised to own at least one tank for every refrigerant type serviced, plus an extra for burnouts and other unknowns.

Planning ahead

Knowing the quantity of refrigerant is important for planning storage requirements, as well as planning for the actual recovery. For instance, any system with more than 5lbs. of refrigerant is likely to have areas where the liquid can get trapped.

The key to a quick recovery procedure is to get the liquid out first, and then get the remaining vapor out. However most systems are not "recovery friendly." That is they don't have access ports at their lowest points. If some units you're servicing are on maintenance contracts, you would save significant time by installing access ports at all of the lowest points in the system, where liquid is likely to accumulate. Since



most systems don't have these ports you need to be prepared to boil off the trapped liquid with a heat gun, whenever it's found. An indicator of trapped liquid in a system is frost or condensation forming on the plumbing or components where the liquid is trapped.

The trapped liquid may be in an area that is not visible. In all cases trapped liquid in a system during recovery causes the recovery process to slow down, regardless of the size or type of machine.

If you are unable to locate the trapped liquid (but you know it's there, because the recovery job is taking "forever"), turn on the system compressor (if it's operable) for a few seconds. This will get the refrigerant moving to another part of the system and in.

Hoses and valves:

Hoses and Schraeder valves have a large impact on recovery speed. In general, the larger the hose, the less friction on the flow of refrigerant, the quicker the recovery time. Many contractors are now using 3/8" lines for the input to the recovery machine, even if those lines originate out of 1/4" fittings.

Schraeder valves must be removed from the connection prior to an expedient recovery. Most wholesalers sell a tool for removing these cores, while keeping the connection sealed. The core depressor, in the end of the hose, should also be removed. These two items can turn a 20 minute job into one that goes on for hours. So, be sure to remove Schraeder valves and core de-

pressors before every recovery job.

Another hose consideration is the little rubber grommet at the end of the hose that makes a seal with the flare fitting. We've seen these seals so worn and deformed that when the hose is connected to the flare fitting the grommet virtually seals off the connection. This is probably never noticed in charging, because the pressure opens the grommet, but during recovery (or with suction) the deformed grommet severely restricts the flow of refrigerant.

Refrigerant Recycling

Current regulations state that used refrigerant shall not be sold, or used in a different owner's equipment, unless the refrigerant has been laboratory analyzed and found to meet the requirements of ARI 700 (latest edition). As a result, recycling and verifying ARI 700 conformance isn't economically justified in most cases. It's still a great idea to do as much cleaning of refrigerant going back into the same system (or owners system) as possible. We recommend using the largest, high-acid capacity filter that are economically feasible. Put these filters on the suction or inlet side of the recovery unit. Change filters often.

The recovery of large amounts of liquid refrigerant can sometimes carry with it large quantities of oil, if the system being serviced doesn't have an adequate oil separator installed. If this recovered refrigerant isn't going to be liquid charged back into the same system, you might want to separate the refrigerant from the oil in order to measure the oil (to know how much oil to charge back into the system). Ho-

wever, refrigerant sent back for reclaim does not need to have the oil removed. One of the simplest and most cost effective ways to achieve this is to use a 30 or 50 lb. tank in line with your recovery machine. Connect the system to the liquid port of the tank then from the vapor port of the tank connect to the input of your recovery machine a second tank, for storing refrigerant, should then be connected to the output of the recovery machine. If you encounter large amounts of liquid you will need to put a band heater around the first tank.

When the recovery job is complete the oil can be removed, from the first tank, by applying a small amount of pressure, using nitrogen, to one of the ports and expressing the oil from the other. If you are going to remove the oil from the vapor port you will need to turn the tank upside down. Always wear safety glasses when performing this operation as the oil may be acidic and could cause severe burning.

Keeping the dirt out:

During the recovery process your recovery machine can be exposed to debris that can, potentially, damage it. Including brazing spatter and copper and brass slithers. Further contamination can be introduced from the refrigerant storage tanks.

To prolong the life of your recovery machine always use an in-line filter. Whenever you are charging a system from a recovery cylinder it is a good idea to use an in-line filter to protect the system from contamination. Again, change your in-line filters often.

Getting the Liquid Out (See "Push / Pull-Method")

Push-pull is a method of removing bulk liquid from a system using the pressure differential created by the recovery machine. Push-pull will generally not work on smaller systems because there is no bulk liquid reservoir to create a siphon from.

Push-pull is mostly used on systems with a receiver tank or those with greater than 20 lbs. of refrigerant, or when transferring from one tank to another. The rate of liquid transfer is very much dependent on hose size, with larger hoses providing much better throughput.

Another trick is to chill the tank, if it's partially filled, prior or during recovery. This operation will lower the pressure in the storage tank and therefore speed up recovery. There must be a minimum of 5 lbs of liquid refrigerant in the tank you wish to chill. This operation can be performed prior to or during the recovery. See the two set up diagrams and procedures on page 8 of this manual.

There is nothing magic here, you are simply using your recovery machine to make a refrigerator where the tank is the evaporator. By throttling the output valve, you're effectively creating a capillary tube or an expansion device, but you need to adjust the back pressure to suit the conditions and the refrigerant. Five to ten minutes of chilling can produce some very dramatic tank cooling, depending on the conditions. If there are any non condensable in the tank this process will not work. Also the greater the quantity of refrigerant in the tank, the longer the process will take.



3. GENERAL WORK INSTRUCTIONS AND INFORMATION

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3.1. REQUIRED LEVEL OF EVACUATION OF APPLIANCES
US EPA 20211130

Type of appliance	Inches of Hg vacuum (Relative to standard atmospheric pressure of 29.9 Inches Hg)	
	Using pre-1993 equipment	Using post-1993 equipment
Very high-pressure appliance	0	0
High-pressure appliance, or isolated component of such appliance, with a full charge of less than 200 pounds of refrigerant	0	0
High-pressure appliance, or isolated component of such appliance, with a full charge of 200 pounds or more of refrigerant	4	10
Medium-pressure appliance, or isola- ted component of such appliance, with a full charge of less than 200 pounds of refrigerant	4	10
Medium-pressure appliance, or isolated component of such appliance, with a full charge of 200 pounds or more of refrigerant	4	15
Low-pressure appliance	25 mm Hg absolute	25 mm Hg absolute



3.2. RECOVERY OR REMOVAL OF REFRIGERANT PRIOR TO REPAIR OR DECOMMISSIONING OF EQUIPMENT

1. General

Maintenance and repairs must be carried out with a minimum risk of emissions. Therefore it is important to isolate the section and recover refrigerant from the equipment during maintenance / repair.

Despite the fact that equipment is not in operation, there is still a chance that emissions of refrigerant may occur. For this reason, a modified maintenance interval applies to equipment that is not in operation. If the installation no longer has an operational function, it is advisable to empty the installation for reasons of emission prevention.

2. Resources

The following resources are required for this work:

- Refrigerant Recovery Unit URU 5000
- Recovery cylinder
- Manifold Set 4-way
- Acid Test Kit (for Lubricant oil)

3. Reuse, recycling or disposal

Re-use

If the equipment has been filled with an HCFC, the product can be reused, if local laws allows.

If the equipment has been filled with an HFC, the product may be reused. It is recommended to test the product first (acid test on oil sample).

Recycling

Recycling is the treatment of the refrigerant product from equipment by drying or filtering.

Recycled HCFC may only be used for equipment of the same owner/operator.

Recycled HFC may also be used for commercial purposes.

Disposal

The offering to a supplier of equipment for reclamation and/or destruction.

4. Emptying prior to repair

Depending on the system and the location of the repair/maintenance, it may be possible to (partially) block the refrigerant between two valves.

If the location of the repair and/or the quantity of the refrigerant is such that blocking is not sufficient, the equipment must be (partially) emptied.

5. Ventilating the equipment using the compressor

- Before maintenance or repair work is carried out on equipment, the pressure in the section of the equipment on which the work is being carried out must be brought down to 1.05 bar (absolute) or lower.
- Before equipment is taken out of operation the pressure shall be brought to 0.3 bar (absolute) or lower.
- If the equipment is provided with a liquid vessel, the medium quantity shall be drained off to this vessel before the equipment is opened.

- This shall be repeated if necessary if it appears that the suction pressure subsequently rises again due to evaporation of residual medium in the evaporator(s) and/or the compressor oil.
- If necessary and possible, wait until the temperature of the evaporator has risen to a value that rules out the presence of liquid.
- The pressure valve is closed.
- If the entire liquid content cannot be stored in the liquid vessel, a part can be stored in separate cylinders.
- Suction by means of the compressor is not always possible. In many cases, the content can therefore be pumped to only the medium cylinders without losing the medium, using a pumping unit.
- A refrigeration system with a total medium charge of 3 kg or more should be fitted with at least two shut-off valves or schröder valves, one on the high pressure section and one on the low pressure section, for draining the medium by means of a drain unit.

The use of such a combination is preferable to repeatedly replacing filter driers in the refrigeration system. The risk of media leakage is much lower. The number of filter driers to be replaced and the use of agents remain limited, and so do the costs.

7. Logbook

The results of the performed actions must be processed in the work registration and added to the logbook and reported to the owner/manager.



6. Extracting the installation with an recovery unit and/or recycling equipment

The use of a means of recovery unit is the only way of removing the entire contents from the system in all cases.

By combining it with an interchangeable filter dryer, contaminated refrigerant can be cleaned to a certain extent and any acids and moisture present can be removed.





3.3. VACUUMING PROCESS

1. General

After installation, repair or a pressure test, the equipment must be vacuumed. The purpose of this is to remove non-condensable gases, such as nitrogen, oxygen and moisture (water vapor).

If this is not done, the non-condensable gases will collect in the condenser and cause a very high discharge pressure and discharge gas temperature. This results in higher energy consumption and a risk of disintegration of refrigerant and lubricating oil, creating acids that damage the system and especially the motor winding insulation.

The same effect, but one that is magnified, will occur in the presence of air. The oxygen contained therein will combine with the compressor oil, causing it to acidify even at low temperatures.

2. When to perform

Before filling the equipment, it must be (partially) vacuumed.

3. Resources

The following means are used for vacuuming:

- Vacuum pump < 270 Pa
- Manometer set suitable for the type of refrigerant
- Nitrogen cylinder (N2)
- Reducing valve / pressure regulator

4. Implementation

Vacuuming is carried out by taking at least the following steps:

- Connect the vacuum pump, the nitrogen cylinder with reducing valve and the vacuum meter to the suction and pressure side of the installation using the pressure gauge set.
- Use a pressure gauge set with an extra large vacuum pump connection. Preferably install an additional vacuum meter in the installation, as far away from the vacuum pump as possible.
- Make sure that all the valves in the system are open, energize solenoid valves with a 'strange' voltage if necessary or open manually using a spindle adjustment. The same applies to any: evaporator pressure regulator, condenser pressure regulator, constant pressure regulator, servo-control valve and non-return valves.
- Check the vacuum pump and vacuum gauge (connect the vacuum gauge to the vacuum pump and run the pump for 5 minutes and read the vacuum achieved). The time needed to reach the vacuum depends on the contents of the installation, the amount of moisture present, the ambient temperature, the internal resistance in the pipe system, the pump capacity and the resistance between the cooling system and the vacuum pump. The indication of the vacuum meter farthest away from the vacuum pump in the system is decisive for the start of the service life. If it is not possible to fit this gauge, the valve in the suction line of the vacuum pump is connected and it is checked whether the vacu

not possible to fit this gauge, the valve in the suction line of the vacuum pump is connected and it is checked whether the vacuum gauge remains at pressure (2 mm Hg). If the pressure rises further, the vacuum process is continued and the vacuum test may not yet begin.

- When the absolute pressure has been reached the vacuum pump is switched off and the vacuum test begins.
- Depending on the size of the equipment, the vacuum must be broken using nitrogen (N₂). For breaking the vacuum the following valves must be closed:
 - Vacuum pump suction valve
 - Valve connection vacuum pump on pressure reducing valve
 - Valve of the vacuum meter
 - Valve of second vacuum gauge
 - The nitrogen bottle is opened to allow the nitrogen to flow until an excess pressure of 0.2 bar develops in the system.
 - The above is repeated if necessary.

The implementation steps described above are the minimum required. Depending on the equipment and the circumstances, it may be necessary to extend the working instruction described.

Instructions for different equipment

After the pressure test, equipment with a refrigerant filling of less than three kilograms must be brought to an absolute pressure of less than 270 Pa. It must

then be possible to maintain the achieved pressure for at least half an hour, with the vacuum pump stationary. The equipment can then be filled with the refrigerant to be used in the equipment.

Equipment with an refrigerant charge of three kilograms or more but less than 30 kilograms must, after the pressure test, be brought to an absolute pressure of less than 270 Pa. It must then be possible to maintain the pressure achieved for at least one hour with a stationary vacuum pump. The equipment can then be filled with the refrigerant to be used in the equipment.

After the pressure test, equipment with an refrigerant charge of 30 kilograms or more but less than 300 kilograms must be brought to an absolute pressure of less than 270 Pa, after which the vacuum can be immediately broken with dry nitrogen. The equipment must then be brought once more to an absolute pressure of less than 270 Pa. It must then be possible to maintain the pressure for at least two hours with the vacuum pump stopped. The equipment can then be filled with the refrigerant to be used in the equipment.

After the pressure test, equipment with an intermediate charge of 300 kg or more must be brought to an absolute pressure of less than 270 Pa, after which the vacuum can be immediately broken with dry nitrogen. The equipment must then be brought once more to an absolute pressure of less than 270 Pa, after which the vacuum can be immediately broken with dry nitrogen. The equipment must then be brought to an absolute pressure of less than 270 Pa for a third time. It must then



be possible to maintain the pressure for at least two hours with the vacuum pump stopped. The equipment can then be filled with the refrigerant used in the refrigeration plant.

See also the table below.



Contents	Operation	Pressure	Duration
0 - 3 kg	Vacuum, pump off	Maintain < 270 Pa	minimum 0,5 hours
$\geq 3 < 30$ kg	Vacuum, pump of	Maintain < 270 Pa	maintain at least 1 hour
$\geq 30 < 300$ kg	break vacuum with N2, vacuum, pump off	Maintain < 270 Pa	maintain at least 2 hours
≥ 300 kg	Vacuum break with N2, vacuum break with N2, pump off	Maintain < 270 Pa	maintain at least 2 hours

5. Deviating guidelines

If it concerns a (partly) pre-filled unit, vacuuming the separate parts is sufficient. The mean filling of the individual section determines which of the procedures should be used.



6. Logbook

The results of the performed actions must be processed in the work registration and added to the logbook. These must also be reported to the owner/manager of the equipment.

In any case, this concerns data about: the pressures achieved, the periods of time, the method used, etc.



3.4. PRESSURE TEST INSTRUCTION

1. Safety requirements

Equipment is demonstrably delivered safe after installation, repair or modification. The safety requirements for equipment are included in the European Pressure Equipment Directive (Directive 2014/68/EU) (PED). In addition, safety and environmental requirements for the design, manufacture, construction, installation, operation, maintenance, repair and disposal of refrigeration systems and heat pumps are included in NEN-EN 378.

2. Different situations

Three situations can be distinguished with regard to pressure testing:

1. New build

If a compact unit is delivered by the manufacturer with a declaration of conformity and the installer only has to connect water, electricity or ducts, no pressure test has to be performed. If a unit is assembled from parts or components which form part of the refrigeration circuit, the various parts or components must be provided with a declaration of incorporation and the installer must carry out a pressure test.

2. Repair

If a part of the refrigeration circuit is repaired (pipe work) or a part is replaced by an equivalent part (same specifications and in possession of a declaration), the installer should carry out a pressure test.

3. Modification

If the refrigeration circuit is modified or if components are replaced by components with a different specification (other application pressure, temperature or refrigerant content), the installer must carry out a pressure test and the newly created assembly must be reassessed and it must be determined whether the applicable declarations still comply (determine category PED).

3. Resources

The following materials are required to carry out a pressure test:

- Nitrogen bottle (N2)
- reducing valve (suitable for the maximum pressure)
- Deposited soap solution
- Vacuum pump (minimum 270 Pa)
- Vacuum meter
- pressure test certificate

4. Execution pressure test

In a pressure test, the following steps are carried out:

- a. Determination of the maximum allowable pressure (PS)
- b. Determination of the crushing pressure
- c. Putting the system under pressure
- d. Checking for deformation and leakage
- e. recording of the results



Ad. a: Determination of the maximum allowable pressure (PS)

- On the HP side, determine the maximum allowable working pressure as stated on the compressor data plate or the condenser data plate.
- On the LP side, determine the maximum allowable working pressure as stated on the evaporator rating plate.

If the rating plates are not legible, accessible or present, the (PS) must be requested from the manufacturer of the equipment or component concerned.

Ad. b: Determination of the discharging pressure

Determine whether the LP side of the equipment can be separated from the HD side:

- If no, then the equipment must be extruded in accordance with (PS) low pressure side.
- If yes, then the equipment must be tested in sections.

Determining the pipe pressure for new constructions

- Compact unit

Check whether the manufacturer has supplied a II.1.A declaration.

- If yes, no pressure test needs to be carried out.
- If not, the supplier must be contacted in order to obtain a II.1.A declaration. After receipt, no pressure test needs to be carried out.

- If the supplier cannot provide a II.1.A declaration, then the equipment should continue as if it were a composite unit.
- Composite unit (refrigeration)

Collect the II.1.B declaration of the refrigeration components and go through the following steps:

- Determine that the components to be tested do not contain any agent.
- Connect the nitrogen bottle and pressure regulator to the equipment.
- Adjust the nitrogen pressure step by step until the pressure is reached.
- Check connections and assembled components with the aid of the leak detection spray.
- Check the installation parts for deformation.
- Check whether the set pressure is maintained.
- If a leak or deformation is found, repair or replace the component and restart the pressure test.
- Note the achieved pressure and standstill time in the work log.

3.5. COMMISSIONING OF EQUIPMENT

1. General

The commissioning of equipment must be carried out in accordance with the supplier's instructions, if any. In the case of a self-assembled unit, the instructions of the sub-suppliers must be followed.

2. Consult documentation

Compact unit (pre-charged):

- User manual
- Declaration of conformity
- CE marking

Composed unit (pre-charged):

- User manual
- Declaration of conformity
- CE marking
- Pressure test certificate
- Vacuum lubrication certificate
- Leak tightness certificate

Composite unit (self-filling)

- User manual
- Declaration of conformity
- CE marking
- Pressure test certificate
- Vacuum lubrication certificate
- Leak-Proofness certificate
- Filling certificate



3. Pre-inspection

- Checking the plant documents for presence and completeness.
- Visual check of the installation.

4. Unit in operation

- Checking the medium pressures and the corresponding temperatures by means of manometer(s).
- Checking of the working temperatures of the equipment by means of a temperature recorder.
- Compare the working pressures and temperatures with the design data of the installation and the ambient temperatures for both the condenser and the evaporator.
- Check the medium charge by means of the sight glass or the liquid level in the liquid vessel (if present).
- Checking of the lubricant level and temperature (if possible).
- Checking of the relief organs that can cause emissions with leak detection devices and/or leak detection equipment with a detection limit of at least 5 ppm.

- Visual inspection of the entire equipment for possible leakage (oil traces, corrosion, vibrations, damage, etc.).
- Visual inspection of parts and pipes for the condition and presence of insulation and/or shielding.
- Check the installation for vibrations and movement.

5. Logbook

The results of the actions and checks carried out must be processed in the work registration and added to the logbook and reported to the owner/manager. In any case, this includes data about the pressures achieved, the standing times, the method used and the leak detection equipment used.

4. VACUUM PUMP 115 / 230 V UVP1550-A3



UNITORTM
by Wilhelmsen



Symbols Used

Symbols Used

Warning notices: structure and meaning

Warning notices warn of dangers to the user or people in the vicinity. Warning notices also indicate the consequences of the hazard as well as preventive action. Warning notices have the following structure:

Warning symbol	KEYWORD: Nature and source of hazard!
	Consequences of hazard in the event of failure to observe action and information given.
	► Hazard prevention action and information.

Safety keywords

The key word indicates the likelihood of occurrence and the severity of the hazard in the event of non-observance:

Key word	Probability of occurrence	Severity of danger if instructions not observed
DANGER	Immediate impending danger	Severe injury
WARNING	Possible impending danger	Major injury
CAUTION	Possible dangerous situation	Minor injury

Symbols on the product

Symbol	Description
	Read the Operating Instructions before use
	Wear protective goggles
	Wear a safety mask
	Wear protective gloves
	Check oil level
	General warning

Safety Instructions

Symbol	Description
	Warning: Explosive material
	Warning: Flammable material
	Warning: Hot surface

Safety Instructions

Read these Operating Instructions thoroughly before putting the product into operation. Keep these Operating Instructions in safe custody for future reference. Wilhelmsen Ships Service reserves the right to change, update, or modify the original instructions at any time without prior notice.



DANGER: RISK OF EXPLOSION



- ▶ **Do not use in hazardous-rated environment:** This unit is not certified as explosion proof for hazardous-rated environments. It is only to be used in normal environments.
- ▶ **Proper functioning of all safety devices and personal protective equipment must be checked before operating the equipment.**
- ▶ **Do not connect the vacuum pump to a pressurized Air-Conditioning and Refrigeration (A/C-R) system.** Connecting to a pressurized A/C-R system may cause damage to equipment and injury to the user.



DANGER: RISK OF FIRE

- ▶ **Do not use near any exposed flammable substances: spills, open containers, etc.**
- ▶ **Do not operate this equipment with low or no oil.** Running this equipment with no lubricants will cause premature failure.



Safety Instructions



DANGER: RISK OF HEART ARRHYTHMIA, LOSS OF CONSCIOUSNESS, SUFFOCATION, AND IRRITATION FROM EXPOSURE TO REFRIGERANT VAPORS OR MIST.



▶ **Wear personal protective equipment to protect skin, eyes, and respiratory system when working with refrigerants.**



▶ **Provide adequate ventilation to the work area:** Use a suitable ventilation fan to maintain a minimum of 5 air changeovers per hour in the workspace.

▶ **Read manufacturer's Material Safety Data Sheet for additional safety information on refrigerant and lubricants.**



WARNING: RISK OF ELECTRICAL SHOCK

▶ **Ensure voltage selector setting on vacuum pump matches the power supply before switching on vacuum pump.**

▶ **Ensure proper grounding of main before connecting the vacuum pump.**

▶ **Avoid use of extension cord:** If extension cord is used, then ensure voltage at vacuum pump electrical port is within +/-10% of the rated voltage. Ensure the extension cord is 3 wire, 18AWG no longer than 8m. Extension cords smaller than 18AWG will result in a drop in line voltage and loss of power and/or overheating.



CAUTION: HOT SURFACE - RISK OF BURNS AND BODILY INJURY.



▶ **Wear personal protective equipment.**

▶ **Avoid touching hot surfaces on the vacuum pump.**

▶ **Use extreme caution when disconnecting any hose.**

Safety Instructions

Additional Safety Instructions for Servicing A/C-R Systems Containing Flammable (Class A2, A2L, A3) Refrigerants

The following are additional safety instructions for servicing A/C-R equipment containing Class A2, A2L, or A3 refrigerants. These instructions do not replace existing occupational hazard procedures or regulations that may be required by local, state, or federal agencies.

Technicians working on Class A2, A2L, and A3 systems should have detailed knowledge of and skills in: handling flammable refrigerants, personal protective equipment, refrigerant leakage prevention, handling of cylinders, charging, leak detection, and proper disposal. Additional knowledge of legislation, regulations, and standards relating to flammable refrigerants may also be required. Special certification or licensing may be required on Class A2, A2L, and A3 refrigerant handling. Check local occupational safety codes.

FOR USE BY PROFESSIONALLY TRAINED, CLASS A2L, A2, OR A3 CERTIFIED OPERATORS ONLY. LOCAL AND NATIONAL AGENCIES MAY REQUIRE THE USER TO BE LICENSED. CONSULT LOCAL GOVERNMENT AGENCY.



DANGER: RISK OF EXPLOSION

- ▶ **Take all precautions to avoid mixing flammable refrigerants with air:** Mixing air with flammable refrigerant could cause explosion.



CAUTION: RISK OF FIRE

- ▶ **Mark a 3-meter perimeter around the refrigeration equipment as a Temporary Flammable Zone, post NO SMOKING and other hazard signs, and notify the local supervisor.**
- ▶ **Disable all potential ignition sources within the Temporary Flammable Zone.**
- ▶ **Ensure the A/C-R equipment's power has been discontinued before servicing.**
- ▶ **Electrical connection between vacuum pump and power source must be made outside the Temporary Flammable Zone.**
- ▶ **A flammable gas detector should be used to monitor the atmosphere in the temporary flammable zone.**
- ▶ **Provide adequate ventilation to the work area:** Use the optional exhaust adapter kit and hose (Part No. RA1500-A3) to route vacuum pump exhaust to fresh air or a safe location outside the work area. Use a suitable ventilation fan to maintain a minimum of 5 air changeovers per hour in the workspace.



User group



CAUTION: RISK OF FIRE

- ▶ Ensure refrigerant has been safely removed from the A/C-R system before servicing.
 - ▶ Before evacuating a Class A2, A2L, or A3 system, the system should be purged with 100% Nitrogen. Do not use air.
 - ▶ Ensure a dry powder or CO2 fire extinguisher is available at the service location.
-

THESE INSTRUCTIONS DO NOT REPLACE ANY OCCUPATIONAL HAZARD PROCEDURES, REGULATIONS, OR RESTRICTIONS.

Bosch Automotive Service Solutions GmbH declines all responsibility for claims resulting from use beyond the intended use (see *Application: page 7*) and/or resulting from actions that do not adhere to any relevant guidelines, requirements, or regulations. All possible use scenarios cannot be predicted; the user assumes all responsibility for ensuring appropriate precautions are taken for a given use case.

User group

The UVP1550-A3 must be used only by a qualified refrigerant system service technician trained in: handling of refrigerants (including flammable refrigerant classes A2, A2L, A3), personal protective equipment, refrigerant leakage prevention, handling of cylinders, charging, leak detection, and proper disposal. All work conducted on pressurized equipment should be performed by persons with sufficient knowledge and experience in handling pressurized devices. Those persons should also be aware of the risks and requirements involved in the use of pressurized devices.

Product Description

Product Description

Application

The vacuum pumps are used for evacuation and dehydration of A/C-R (Air-Conditioning and Refrigeration) systems. These products are NOT intended to remove refrigerant and should never be used on pressurized systems. Ensure that the system is at or below atmospheric pressure before connecting the vacuum pump.

The vacuum pumps are developed using spark-proof components to ensure safe operation while servicing A/C-R systems with lower toxicity and low-to-high flammability class of refrigerants: Only Class A1, A2, A2L, and A3 refrigeration as defined in ASHRAE Standard 34.

Included components

Description
Vacuum Pump
Operating Instructions
Locking Power Cord (EU)
Vacuum Pump Oil

Unit layout

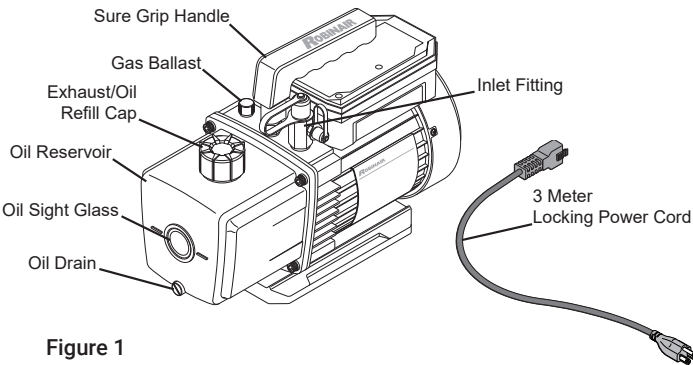


Figure 1



Commissioning

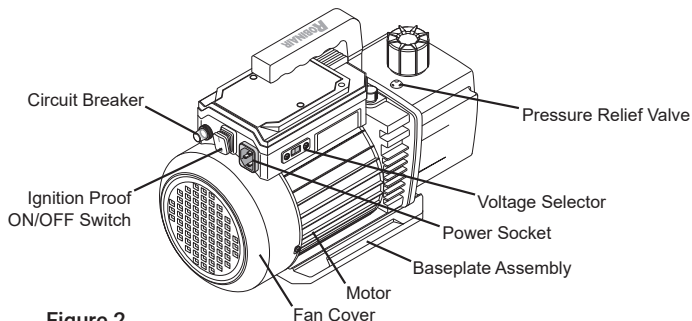


Figure 2

Features

Feature	Description
High Vacuum Rating	Two-stage rotary vane design provides powerful, quiet, high-vacuum capacity that ensures moisture removal and reduces evacuation time.
Dual Voltage	Voltage selection switch for 115V or 230V.
Ignition-Proof Design	Third-party ignition-proof testing completed with flammable refrigerant (Class A3).
Gas Ballast	Allows a precise amount of atmospheric air to be introduced into the pump, preventing condensation of moisture vapor; thereby helping to maintain the purity of the pump oil. By using the gas ballast, the pump operates more efficiently, a deeper vacuum can be obtained more quickly, and pump life is extended.
Sure-Grip Handle	The one-piece, molded handle makes it easy to carry the pump to and from job sites, and the handle stays cool to the touch during operation.
Compact & Lightweight Design	Aluminum housing and rotary vane pump design keep the pump weight lower, making it easy to carry.

Commissioning

Unpacking

1. Ensure all included components are present
(see *Included components*: page 7).
2. Check for signs of damage or defect. Contact customer service with any quality concerns. Do not use if possible damage or defect is found.

Commissioning

Before first use

Check electrical connection

The UVP1550-A3 can be connected to either 115V or 230V (50/60Hz). Default position of voltage selector is 230V.

1. Set voltage selector switch (1) as needed to ensure the voltage setting matches the power supply rating at the outlet (see Figure 3).
2. Ensure protective voltage switch cover is in the closed position to prevent accidental changes.
3. Connect power cord (2) to vacuum pump (see Figure 3).

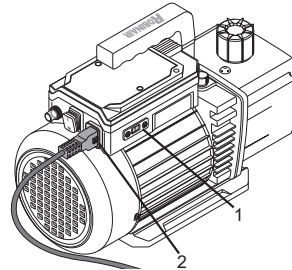


Figure 3

Note: When fully inserted, the locking power cord prevents accidental disconnection. To disconnect the power cord, first press the red button on the power cord to unlock it, then pull the cord. Use a locking power cord to ensure safe operation with A2, A2L, and A3 class refrigerants.

Fill oil

The vacuum pump is shipped without oil in the reservoir and needs to be filled before use.

1. Ensure vacuum pump is not connected to power source.
2. Remove exhaust/oil fill cap (1) (see Figure 4).
3. Add oil to oil reservoir until the oil level is aligned with the marks on either side of the sight glass (3) (see Figure 4).

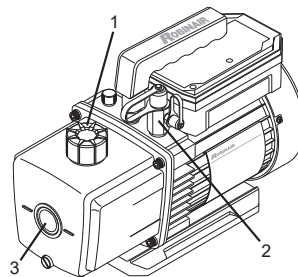


Figure 4

Note: Maintain oil quantity and quality for ultimate vacuum performance.

4. Replace exhaust/oil fill cap (1) (see Figure 4).
5. Remove one inlet port cap (2) (see Figure 4).

Vacuum Pump Operation

6. Connect unit to power source and switch vacuum pump ON (1) (see Figure 5).
7. Allow the pump to run for 10-15 seconds, then replace the cap on the inlet port while the pump is running.
8. After pump has run for one minute, Switch pump OFF (1) (see Figure 5), check oil level in sight glass (3) (see Figure 4), and add oil if necessary.
9. Vacuum pump is now ready for use.

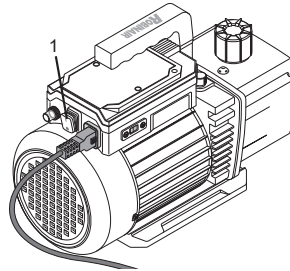


Figure 5

Vacuum Pump Operation

Before connecting the vacuum pump to an A/C-R system, remove refrigerant from the system with an approved recovery device. Connecting the pump to a pressurized system may result in pump damage or serious injury to the user.

Setup

1. Ensure pump is adequately filled with clean oil (see Fill oil: page 9).
2. For A2, A2L, and A3 Class systems, use the optional Exhaust Adapter Kit and hose (Part No. RA1500-A3) to route exhaust gas to fresh air or a safe space outside the service area.
3. Connect a refrigeration service hose (1) to vacuum pump inlet (2) and the manifold gauge set (3) (see Figure 6).

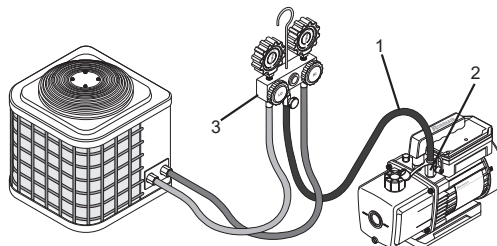


Figure 6

Vacuum Pump Operation

Note: For faster evacuation, it is recommended to use a 3/8" refrigeration hose connected to the larger inlet port.

4. Connect high-side and low-side service hoses to the respective service ports of the A/C-R system (see Figure 6).

Note: The additional in-line connection of a separate high-vacuum gauge will provide a more accurate measurement of the evacuation process.

5. Check manifold gauges to ensure no pressure is in the system.
6. Check voltage selector switch position (2) (see Figure 7) to ensure voltage selection matches voltage rating of power supply.
7. Connect vacuum pump power cord to power supply.

Evacuating

1. Switch ON (3) the Vacuum pump (see Figure 7).
2. Open all manifold valves to begin evacuation of the system.
3. Operate the gas ballast valve to maximize pump performance and reduce pump oil contamination (see Gas ballast valve operation: page 11).

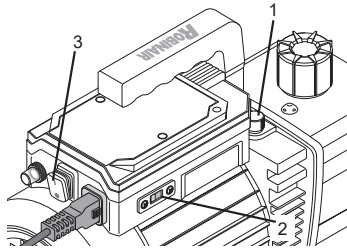


Figure 7

4. Run the vacuum pump until desired vacuum level is reached.

Note: Proper evacuation of a system is based on ultimate absolute pressure readings, not time. Ambient temperature affects the target micron reading, which ensures the boiling of all moisture in the system. For vacuum pressure standards, refer to Section 5.3.8 EN378-4, which specifies an acceptable pressure of 270 Pa absolute. For manufacturer guidelines, consult the service manual of the A/C-R system being serviced.

Gas ballast valve operation

Opening the gas ballast valve introduces fresh air into the vacuum pump's 2nd stage, mixing with the gas or vapor being pumped to remove moisture and allow for deeper final vacuums.

The gas ballast valve (1) is located beside the handle, opposite the inlet fitting (see Figure 7).



Maintenance

1. Start the pump and open the gas ballast valve until the system has reached 1000–3000 microns.

Note: The gas ballast valve may be opened or closed at any time during pump operation.

2. Close the gas ballast valve to allow the pump to pull down to its ultimate vacuum level.

Note: The ultimate micron rating of the pump will only be reached when the gas ballast valve is fully closed.

Shutdown procedure

Following this shutdown procedure will promote easy starting and help prolong the life of the pump:

1. Close manifold valve(s) between the pump and the system
(see Figure 6).
2. Remove hose from pump inlet (2) (see Figure 6).
3. Switch OFF (3) the Vacuum pump (see Figure 7).
4. Cap the inlet port to prevent any contamination or loose particles from entering the port (2) (see Figure 6).

Maintenance

The type and condition of oil used in any high vacuum pump are extremely important in determining the ultimate attainable vacuum. To ensure optimal oil condition and ultimate attainable vacuum, it is recommended to change the vacuum pump oil after each use.

Always use the recommended vacuum pump oil (see *Technical Specifications: page 15*). The oil provided with the pump has been specially blended to maintain maximum viscosity at normal running temperatures and cold-weather starts.

Oil change

1. Turn on vacuum pump and run for 5 minutes to warm the oil.
2. Place an oil-collecting container below the oil drain port.
3. Remove exhaust/oil fill cap.
4. Remove oil drain fitting to drain oil, and tilt the vacuum pump toward the oil drain port to ensure complete drainage.
5. Install and tighten the oil drain valve.
6. Fill oil (see *Fill oil: page 9*).

Note: Collected oil must be disposed of according to local regulations.

Troubleshooting

Troubleshooting

Condition / Problem	Possible Cause	Solution
Pump does not reach a deep vacuum	Leaks in connections or system	Verify pump will reach a deep vacuum connected only to a gauge; if yes, then check for leaks in lines and system, isolating each component in sequence. Repair leaks / tighten connections as needed
	Insufficient oil in pump	Check oil level and add if necessary
	Dirty or improper oil	Change oil (see <i>Oil change: page 12</i>)
	Gas ballast open	Close / tighten gas ballast knob
	One inlet port not capped tightly	Tighten cap on inlet port not in use
	Internal leaks or worn components	Contact Customer Service
Pump does not start	No power to motor	Check mains outlet for power
	Fuse/breaker tripped	Check fuse / breaker on pump
	Incorrect voltage selected	Check that power supply matches selected voltage
	Thermal cut-out on motor is tripped	Check if pump is unusually hot, allow to cool for 1 hour, retry start. See below
Thermal cut-out trips	Low or improper voltage	Check that power supply and selected voltage on pump match
	Very Cold weather; oil viscosity causing issues	Attempt to start pump with inlet open to atmosphere; run for 1 minute to warm oil
	Dirty or improper oil	Flush and change oil (see <i>Oil change: page 12</i>)
Fuse/breaker trips	Incorrect voltage selected	Check that power supply matches selected voltage
	Electrical short	Contact Customer Service
Pump appears to run hot (high temperature)	Low or improper voltage	Check that power supply and selected voltage on pump match
	Insufficient oil in pump	Check oil level and top up if necessary
	Worn bearings	Contact Customer Service



Replacement Parts

Condition / Problem	Possible Cause	Solution
Pump is unusually noisy	Insufficient oil in pump	Check oil level and top up if necessary
	Dirty or incorrect oil	Change oil (see <i>Oil change</i> : page 12)
	Air leaks in connections or system	Check for leaks in lines and system, isolating each component in sequence. Repair leaks / tighten connections as needed.
	One inlet port not capped tightly	Tighten cap on inlet port not in use
	Loose motor bolts	Tighten bolts
	Mechanical issue with coupling/bearing/etc.	Contact Customer Service
Pump leaks Oil	Loose Oil Drain plug	Check for correct threading and / or tighten
	Oil level too high	Check for proper oil level with pump switched OFF
	Positive pressure in oil reservoir	Ensure unit is not connected to a pressurized system / vessel
	Mechanical issue with reservoir or seals	Contact Customer Service

Replacement Parts

Part Number	Part Description
RAVPA3-1	EU power cord with locking connector (all models)
RAVPA3-3	Oil Fill/Exhaust cap (UVP1550-A3)
RAVPA3-5	Oil drain plug (all models)
RAVPA3-6	Inlet Fitting 1/4" MFL x 3/8" MFL with caps (Models UVP1550-A3)
RAVPA3-7	Inlet Fitting 1/4" MFL x 3/8" MFL with caps (Models UVP1550-A3)
RAVPA3-8	Gas ballast valve (all models)
RAVPA3-9	Handle (all models)
RAVPA3-10	Baseplate Assembly (Models UVP1550-A3)
RAVPA3-12	Fan Cover (Models UVP1550-A3)
RAVPA3-13	Fan Cover (Model UVP1550-A3)
RAVPA3-14	Exhaust hose (all models)
RAVPA3-15	Exhaust hose adapter (all models)

Accessories

Accessories

These accessories are optional and sold separately.

Part Number	Part Description
RA1500-A3	Exhaust venting kit: Exhaust adapter, 10m hose, carrying case
RAVPA3-2	UK power cord with locking connector

Technical Specifications

Specification	UVP-1550-A3
Max Current	115V 50/60HZ- 6.26 A 230V 50/60HZ- 3.2 A
Free Air Displacement	5 cfm (142 l/m) @60Hz 4.1cfm (116 l/m) @50Hz
Ultimate Vacuum	15 microns (2 Pa)
Stages	2
Motor	350W
Intake Ports	1/4" & 3/8" Flare
Oil Capacity	480 ml
Dimensions	348 x 140 x 272 mm
Net Weight	11,2 kg

Decommissioning

Disposal of electronic items



This product is subject to European guidelines 2012/19/EU.

Old electrical and electronic devices, including cables, accessories and battery pack, that are defective or no longer in use, must be disposed separately from household waste.

Use the return and collection systems in place for disposal in your area.



Warranty

Damage to the environment and hazards to personal health can be prevented by properly disposing of old equipment.

Follow local regulations for disposal of electronic items.

Disposal of oil

Oil must be disposed of in accordance with local regulations. For correct oil disposal procedures, consult local environmental or waste management agencies.

Warranty

This product is warranted to be free from defects in workmanship, materials, and components for a period of one year from date of purchase. All parts and labor required to repair defective products covered under the warranty will be at no charge. The following restrictions apply:

1. The limited warranty applies to the original purchaser only.
2. The warranty applies to the product in normal usage situations only, as described in the Operating Manual. The product must be serviced and maintained as specified.
3. If the product fails, it will be repaired or replaced at the option of the manufacturer.
4. Transportation charges for warranty service are not covered.
5. Warranty service claims are subject to authorized inspection for product defect(s).
6. The manufacturer shall not be responsible for any additional costs associated with a product failure including, but not limited to, loss of work time, loss of refrigerant, and unauthorized shipping and/or labor charges.
7. All warranty service claims must be made within the specified warranty period. Proof-of-purchase date must be supplied to the manufacturer.

The Limited Warranty does not apply if:

- The product or product part is broken by accident.
- The product is misused, tampered with, or modified.

For more information on the terms and conditions for the sale of goods and services, visit www.atp-europe.de.

5. DIGITAL WEIGHING PLATFORM ADS-100



UNITORTM
by Wilhelmsen



NOTE:

- i** False readings may occur if the scale is used in environments having high electrical noise. False readings may also occur if the cylinder touches the case or controls, or if anything touches the platform, especially the cord to the control box.
-

Setup:

1. Place the unit on a firm and level surface.
 2. Remove the control box from the case in order to provide clearance.
 3. Switch unit on by pushing the **ON / OFF** button.
 4. Select the desired unit of measure by pressing and releasing the **UNITS** button. Three scales are available:
 - lbs./oz. (0 lbs. 0.0 oz.)
 - decimal pounds (0.000 lbs.)
 - kilograms (0.000 kg)
-

Operation:

1. Carefully place refrigerant cylinder in center of the platform.
2. Connect refrigerant cylinder to a charging manifold via utility hose if charging refrigerant, or to a recovery machine if recovering refrigerant.
3. Open refrigerant tank valve. Purge air from hoses.
4. Press **ZERO** button, display changes to zero.

5. Open manifold valve(s), or turn on recovery unit. Refrigerant begins to flow, and display indicates the weight being removed (if charging) or added (if recovering). A minus sign (-) appears if weight is being removed.
 6. Monitor the display; when desired charge or maximum allowable fill is reached, close the cylinder valve and manifold valves, and/or switch off the recovery unit.
 7. When operation is complete, turn unit off by pushing the **ON / OFF** button. Close cylinder valve, disconnect hose(s), and store the unit.
-

Low Resolution Mode:

In normal operating mode, the high resolution of the scale may lead to noticeable fluctuations in the reading caused by weight shifts or wind. To improve this situation, a low resolution mode may be activated.

1. With scale switched on, with any unit or weight displayed, press and hold the **UNITS** button.
2. The enunciators (units of measure) will begin to flash.
3. Release the button and continue normal operation. Resolution is now reduced by a factor of 5 (1.0 oz./0.050 lbs./20 g) and will provide stable readings under extreme conditions.
4. To return to the normal resolution mode, depress and hold the **UNITS** button until the enunciators stop flashing.

Weight Measurements:

The unit may be used strictly as a weight scale.

- 1. Follow steps 1 through 4 in Setup.
- 2. Press the **ZERO** button. Display changes to zero.
- 3. Carefully place the object (e.g., cylinder) that is to be weighed directly in the center of the platform.
- 4. Gross weight will be displayed.
- 5. When weighing has been completed, turn unit off.

This feature is especially useful when re-covering. To calculate the amount of refrigerant in a tank, subtract the "Tare" weight (marked on cylinder) from the displayed amount to find the quantity of refrigerant in the cylinder.

Over-Range Indication:

If the gross weight applied to the platform exceeds the specified range, the unit will display a single 1 at the left of the display.

Battery Installation:

The BATTERY enunciator will appear when the battery needs replacing. A display of "---" indicates battery voltage insufficient for operation. Replace battery in order to resume operation.

- 1. Remove battery from control box by removing the battery cover located on the back of the box.

- 2. Disconnect the battery from the battery clip.
- 3. Attach a new 9 V alkaline battery to the clip.
- 4. Install new battery and cover.

Specifications:

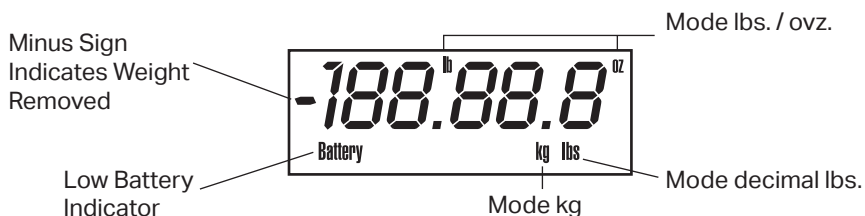
Range	0 lbs. 0.0 oz. to 199 lbs. 15.8 oz. 0.000 lbs. to 199.990 lbs. 0.000 kg to 100.000 kg
Resolution Normal Low	0.2 oz. / 0.010 lbs. / 4 g 1.0 oz. / 0.050 lbs. / 20 g
Accuracy	± 0.5 % of reading ± 1 digit
Power Supply	One 9 V alkaline battery
Battery Life	30 hrs. (approx.)
Operating Temperature	32° F to 120° F (0° C to 49° C)
Weight	6.15 lbs. (2.79 kg)
Dimensions	15.25 x 10.5 x 2.5"



Features of the Scale:



Display Indicators:



Warranty and Repair Policy

This instrument has been designed to provide unlimited service. Should it become inoperative after the user has performed recommended maintenance, a no-charge repair or replacement will be made to the original purchaser. This applies to all repairable units that have not been damaged or

tampered with. An additional 90-day warranty period will cover the repaired or replaced unit. If you have questions or need technical assistance, call toll-free to speak with a Customer Service Representative: (800) 327-5060.

6. REFRIGERANT LEAK DETECTOR UNIRX-1A



UNITORTM
by Wilhelmsen



General information:

The UNIRX-1A refrigerant leak detector is the culmination of over 30 years of Leak Detector manufacturing experience. UNITOR is proud to present these tools into which we have incorporated all of our experience, and years of customer feedback, in the hope of providing our valued customers with the best of everything; price, performance and reliability.

An advanced micro-processor is at the heart of each unit. It permits more advanced management of the circuitry and sensing tip signal than ever before possible. Additionally, the number of components used in the circuit is reduced 50 %, increasing reliability and efficiency. The micro-processor monitors the sensing tip and battery voltage levels 4000 times per second, compensating for even the most minor fluctuations in signal. This translates into a stable and dependable tool in almost any environment.

Convenience features have been added to enhance usability. A revolutionary new case design gives the user grip and control, and places the visual indicators in direct sight during use.

Please take a few moments to read through the following pages, in order to understand and benefit from all the capabilities of your new RX-1A. We trust that you will be 100 % satisfied with your new purchase.

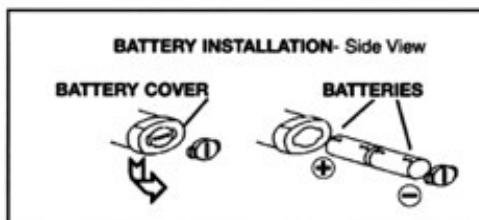
Features:

- Microprocessor controlled circuit with Advanced Digital Signal Processing

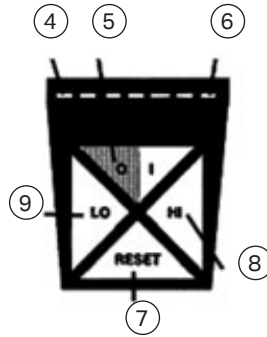
- Six segment visual leak size indicator
- True mechanical pump provides positive airflow through sensing tip
- High and Low sensitivity levels
- One touch reset
- Tactile keypad controls
- Real time sensitivity adjustment
- Detect ALL Halogenated refrigerants
- Certified to SAE J 1627 for R 12, R22 & R 134a
- Variable frequency audible alarm
- Constant Power Indication
- Cordless and portable, operate on 2 C-cell batteries
- 14" (35.5 cm) flexible stainless probe
- Spare sensing tip included
- CE Approved
- Carrying case included, optional holster and reference leak source

Getting started – installing batteries

Remove the battery compartment door located on the bottom of the instrument as shown above. Install batteries, Positive Polarity inwards (towards the unit).



Parts & controls:



- ① Sensing Tip
- ② Tip Protector
- ③ Flexible Probe
- ④ Constant Power Indicator
- ⑤ Power On / Off
- ⑥ LED Leak Indicators
- ⑦ Reset Button
- ⑧ High Sensitivity
- ⑨ Low Sensitivity

Operating features:

Constant power indication

The Constant Power indicator allows the user to see the battery level at all times. The first LED (leftmost) in the bargraph will remain on whenever the unit is powered on. If the LED is dim, or is not lit, this is an indication that the batteries should be replaced.

Automatic circuit / reset feature

The detector features an Automatic circuit that sets the unit to ignore ambient concentrations of refrigerant. Additionally features a Reset function key for convenience.



- Automatic Circuit - Upon initial power on, the unit automatically sets itself to ignore the level of refrigerant present at the tip. Only a level, or concentration, greater than this will cause an alarm.

CAUTION:



Be aware that this feature will cause the unit to ignore any refrigerant present at turn on. In other words, with the unit off if you place the tip up to a known leak and switch the unit on, no leak will be indicated!

- Reset Feature - Resetting the unit during operation performs a similar function, it programs the circuit to ignore the level of refrigerant present at the tip. This allows the user to 'home-in' on the source of the leak (higher concentration). Similarly, the unit can be moved to fresh air and reset for maximum sensitivity. Resetting the unit with no refrigerant present (fresh air) causes any level above zero to be detected.
-

To reset the unit

Press the RESET key. Whenever the unit is reset, all LED's will light for 1 second. This provides a visual confirmation of the reset action.

Sensitivity adjustment

The UNIRX-1 A provides two levels of sensitivity. The base beeping tone is an indication of sensitivity level; the quicker beep rate indicates a higher level. When the unit is switched on, it is set to the high sensitivity position.

1. To change the sensitivity, press the LO key. When the key is pressed, the visual display will momentarily show the four left LED's red. The base beep rate will slow, indicating Low Sensitivity level.
 2. To switch back to High Sensitivity, press the HI key. The three right LED's will light momentarily, and the base beep rate quickens.
-

Operating instructions:

1. Switch the unit on Press the "I/O" (Red and Green) key. All LED's will light for two seconds as the unit performs a self check.
2. The unit will begin beeping at a steady rate.
3. Verify the battery level by observing the constant power indicator (see above).
4. Begin searching for leaks. When refrigerant is detected, the audible tone will change to a 'siren' type sound, distinctly different from the base beep rate. Additionally, the visual indicators will light progressively as described in the Alarm Indications section.
5. Sensitivity can be adjusted at any time during operation by using the HI or LO keys.
6. If a full alarm occurs before the leak is pinpointed, RESET the unit as described above, to reset the circuit to a zero reference.

Operating tips:

The following section includes several general operating tips, and the SAE J1628 recommended procedure for leak detection.

1. In areas that are heavily contaminated with gas, the unit may be reset to block out ambient concentrations of gas. The probe should not be moved while the unit is being reset. The unit can be reset as many times as needed.
2. In windy areas, even a large leak can be difficult to find. Under these conditions, it is best to shield the potential leak area.
3. Be aware that the detector may alarm if the sensing tip comes in contact with moisture and/or solvents. Therefore, avoid contact with these when leak checking.

shop towel or blown off with shop air. No cleaners or solvents should be used, since the detector may be sensitive to their ingredients.

3. Visually trace the entire refrigerant system, and look for signs of air conditioning lubricant leakage, damage, and corrosion on all lines, hoses, and components. Each questionable area should be carefully checked with the detector probe, as well as all fittings, hose to line couplings, refrigerant controls, service ports with caps in place, brazed or welded areas, and areas around attachment points and hold-downs on lines and components.
4. Always follow the refrigerant system around in a continuous path so that no areas of potential leaks are missed. If a leak is found, always continue to test the remainder of the system.

SAE J1628 recommended procedure

i NOTE: On Automotive A/C Systems, test with the engine not in operation.

1. The air conditioning or refrigeration system should be charged with sufficient refrigerant to have a gauge pressure of at least 340 kPa (50 psi) when not in operation. At temperatures below 15° C (59° F) leaks may not be measurable, since this pressure may not be reached.
2. Take care not to contaminate the detector probe tip if the part being tested is contaminated. If the part is particularly dirty, or condensate (moisture) is present it should be wiped off with a dry

5. At each area checked, the probe should be moved around the location, at a rate no more than 25 to 50 mm / second (1-2 in / second), and no more than 5 mm (1/4 in) from the surface, completely around the position. Slower and closer movement of the probe greatly improves the likelihood of finding a leak (see below). Any increase in beep rate is indicative of a leak.





6. An apparent leak shall be verified at least once as follows:

- a) Blow shop air into the area of the suspected leak, if necessary, and repeat the check of the area. In cases of very large leaks, blowing out the area with shop air often helps locate the exact position of the leak.
- b) First move the probe to fresh air and re-set. Then hold the probe tip as close as possible to the indicated leak source and slowly move around it until the leak is confirmed.

Automotive A/C systems only

7. Leak testing of the evaporator core while in the air conditioning module shall be accomplished by turning the air conditioning blower on high for a period of 15 seconds minimum, shutting it off, then waiting for the refrigerant to accumulate in the case for 10 minutes.

After such time, insert the leak detector probe into the blower resistor block or condensate drain hole, if no water is present, or into the closest opening in the heating / ventilation / air conditioning case to the evaporator, such as the heater duct or a vent duct. If the detector alarms, a leak apparently has been found.

All systems

8. Following any service to the refrigerant system and any other service which disturbs the refrigerant system, a leak test of the repair and the service ports of the refrigerant system should be done.

Applications:

The Leak Detector covered by this manual may be used to:

- Detect refrigerant gas leaks in Air Conditioning or Refrigeration systems and storage / recover containers. These detectors will respond to ALL halogenated (contains Chlorine or Fluorine) refrigerants. This includes, but is not limited to:

CFCs e.g. R12, R11, R500, R503 etc...

HCFCs e.g. R22, R123, R124, R502 etc...

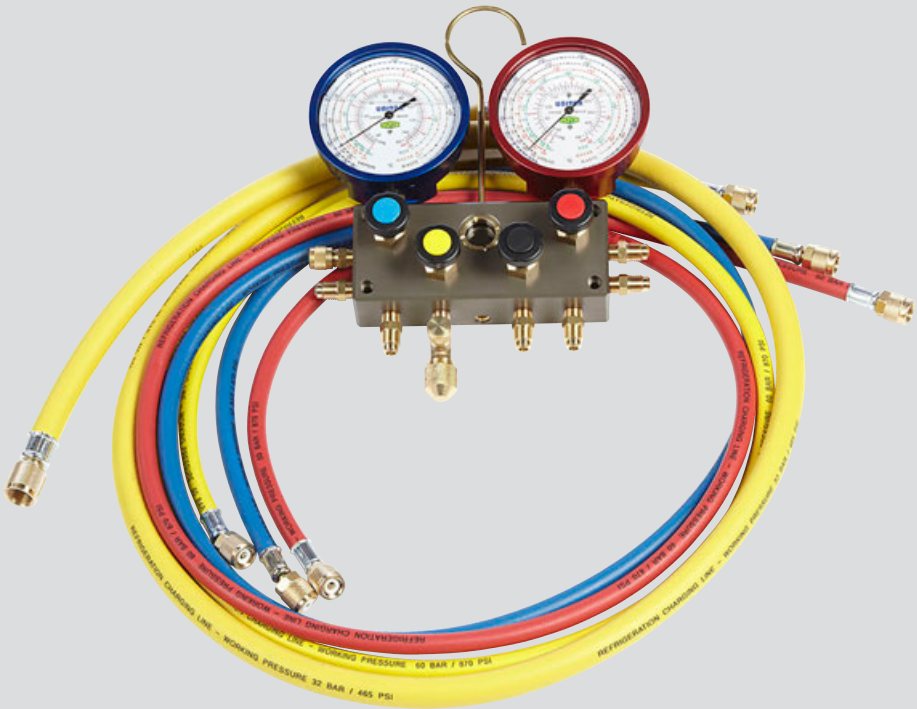
HFCs e.g. R134a, R404a, R125 etc...

Blends such as AZ-50, HP62, MP39, R410a etc...

HFOs e.g. R448A, R449A, etc...

- Detect Ethylene Oxide gas leaks in hospital sterilizing equipment (detects halogenated propellant)
- Detect SF-6 in high voltage circuit breakers
- Detect most gases that contain Chlorine, Fluorine and Bromine (halogen gases)
- Detect cleaning agents used in dry cleaning applications such as perchloroethylene.
- Detect Halon gases in fire extinguishing systems

7. DELUXE MANIFOLD SET 4-WAY



UNITORTM
by Wilhelmssen



IMPORTANT:

-  **Read this manual carefully and familiarise yourself with the specifications and operation of REFCO manifolds prior to use. These instructions provide important information regarding the operation and service of this manifold.**
-

PURPOSE AND USE:

The manifolds have been designed especially to measure pressure in refrigeration equipment. For use only by trained technicians.

-  The manifold **must not be used** for anything other than refrigeration applications in connection with refrigerants. The manifold is not suitable for liquids or gases other than those indicated on the gauge.
-  The manifold **must not be used** with pressures higher than the pressure scale indicated on the high pressure gauge of the manifold.
-  The manifold **cannot be used** as a pressure regulator, especially not in use with nitrogen N₂.
-  The manifold **cannot be used** with ammonia (NH₃ / R717).

-  Safety goggles and gloves **must be worn** during the use of the manifold.



-  REFCO-products are designed and manufactured for use by technically

trained air conditioning and refrigeration service engineers only. Due to the high pressures, and the physical and chemical nature of refrigerants and oils used in the systems, incorrect application could result in serious accidents, injuries or death.

Extent of delivery:

Details about the variations and contents of the manifold are described in the REFCO catalogue as well as on the web www.refco.ch.

Storage:

Manifolds are high precision measuring instruments. After use store the manifold in a protected environment.

Note:

Do not store the manifold with refrigerant in the unit or hoses.

Technical description:

The 4-way manifold is a high precision instrument. Both gauges, high and low pressure can be readjusted to the zero point. The manifold gauges are marked with temperature and pressure scales or are equipped with interchangeable refrigerant scales. Changeable piston type valves ensure perfect sealing. Glycerine-oil filled gauges are equipped with a safety pressure relief in case of a pressure build up inside the gauge due to a defect. The hoses can be hooked up to the hose anchors on the side and at the front of the t-style for storage. This protects the hoses against contamination or damage.

Use of manifold:

Preparing

Before use ensure that the temperature scales on the manifold gauges match the refrigerants used in the system.

Adjust the gauge with the zero adjusting screw to zero. Position of the hand may vary and might not point to zero depending on the atmospheric pressure. Readjusting the gauge might therefore be necessary before each use of the manifold. The zero adjusting screw is positioned either at the top or through the front lens depending on the type of manifold.

The different types of available manifolds are:

Deluxe Manifold set 4-way ⇄ lift plastic plug on lens ⇄ screw on dial

After adjusting replace the lens or the plastic plug.

Connecting the manifold onto a refrigeration system

- Close all valves from the manifold (8, 9, 10, 11)
- Connect compound side (4) ⇄ blue hose
- Connect pressure side (5) ⇄ red hose
- Connect vacuum side (6) ⇄ yellow hose (3/8") on vacuum pump
- Connect vacuum side (7) ⇄ yellow hose (1/4") on refrigerant cylinder or can
- The side connection (X) is prepared for a vacuum gauge (vacuum gauges is not included)

Evacuation of a system

- Switch on vacuum pump
 - Open all valves (8, 9, 10, + 11)
 - Check vacuum shown on vacuum gauge if connected
 - Close all valves (8, 9, 10 + 11) when the vacuum is reached
-

NOTE:

- ❗ **The time for the evacuation is different because it is depending on the size of the system.**
-

Filling of a system

- Remove the yellow hose from the vacuum pump and manifold (6)
- Open black valve (11)
- Open the valve on refrigerant cylinder or can
- Open blue valve (9)
- Fill the needed quantity of refrigerant from cylinder or can into the system. Check the correct quantity of refrigerant with a charging scale like REFCO REF-METER-OCTA and observe the pressure on the compound gauge. If the refrigerant flow into the system is not sufficient, switch on the compressor of the cooling appliance.
- After the filling process close the black valve (11) immediately
- Close the valve of refrigerant cylinder or can too
- Open red valve (10) and check the pressure and temperature of the system
- If the pressure is ok, close all valves
- Remove all hoses and open all valves



8. DIGITAL VACUUM GAUGE UVG-80



UNITOR[™]
by Wilhelmsen

**ON / OFF Button**

Switch the device on or off

**Navigation Button**

Navigate through the screens, menu items or settings

**Enter Button**

Select the settings to enter the menu

compartment. If you will not be using the device for a longer period of time, remove the batteries from the battery compartment.

FUNCTIONS:

- **Switch on / off**

Pressing  briefly switches the device on and pressing  longer switches it off again.

- **Change rate function**

Below 75'000 micron or 100 mbar, a vacuum change rate is indicated. It can give a further indication of how tight a refrigeration circuit is.

- **Reference pressure function**

Press and hold  on the vacuum hold display. This sets the current pressure as the reference pressure. The difference to the reference value is displayed. Press and hold again  to remove the reference pressure.

- **Alarm function**

An alarm value can be set in the menu. If an alarm is set, the icon is displayed in the status bar. If this value is exceeded or undershot, the display flashes. The alarm is acknowledged by pressing any key. With a REFVAC-RC, any alarm value can be set via the REFMesh App.

- **Pressure / vacuum units**

The following units can be set:
mbar, micron, Torr, mTorr, psi, inHg and Pa.

Important safety notice:**Preparation**

Before using the unit, please read the operating instructions carefully, as they contain important information concerning the proper operation, maintenance and disposal of the unit.

Use:

REFCO products are specially developed and manufactured to be used by trained refrigeration installation engineers. Because of the high pressures and the chemical and physical gases used in refrigeration systems, REFCO cannot be held responsible or liable for any accidents, injuries or deaths arising from the use of their products. REFCO explicitly states that their products should only be sold to professionally trained experts.

Preparation:

Insert 3 batteries in the battery compartment at the back of the device.



Ensure the batteries are inserted using the correct polarities. Do not leave used batteries in the battery



- **Display Standby**

You can set the time after which the display switches to the standby mode. It is also possible to switch off this mode completely. The following can be selected: 2 min, 5 min, 60 min and off.

- **Automatic shut off**

If the automatic switch-off is activated, the device switches off after 30 minutes if no user interaction has taken place during this period. The automatic switch-off is independent of the display standby function.

- **Wireless connection**

If the wireless connection is switched on, the REFVAC-RC can be connected with a REFIMATE or with the REFIMESH app. If the connection has not yet been established, the icon in the status bar flashes. As soon as a connection is established, the icon is constantly displayed.

- **Info**

Displays the specific device information after pressing. 

- **Exit menu**

Exit the menu  by pressing the back icon or if there has been no user interaction for 15 seconds, the menu is exited automatically.

- **Power supply**

Instead of AAA-battery's, an alternative power supply can be used with a USB Micro-B cable. For long-term measurements, a power supply is recommended, for which a power bank is suitable. If the

REFVAC or REFVAC-RC is powered via USB, the status bar will show USB instead of the battery symbol.

- **Long-term logging**

A REFVAC-RC can perform a long-term measurement together with a REFIMATE or REFIMESH App. Automatic switch-off must be deactivated for the long-term measurement.

- **Firmware-update**

By holding  and then switching on with  a FW update can be performed using the instructions on the REFVAC screen. The latest firmware version is available in REFIMESH App.

- **Energy saving mode**

After 2 minutes (or the time set in the Display Standby menu item) without user interaction, the O-LED screen is switched off and then flashes briefly every 30s. The energy saving mode is ended by pressing any key. After another 3 minutes, the vacuum value is only renewed every minute. If the device is powered via USB, the REFVAC or REFVAC-RC will not go into energy saving mode.

9. MAINTENANCE & TROUBLESHOOT

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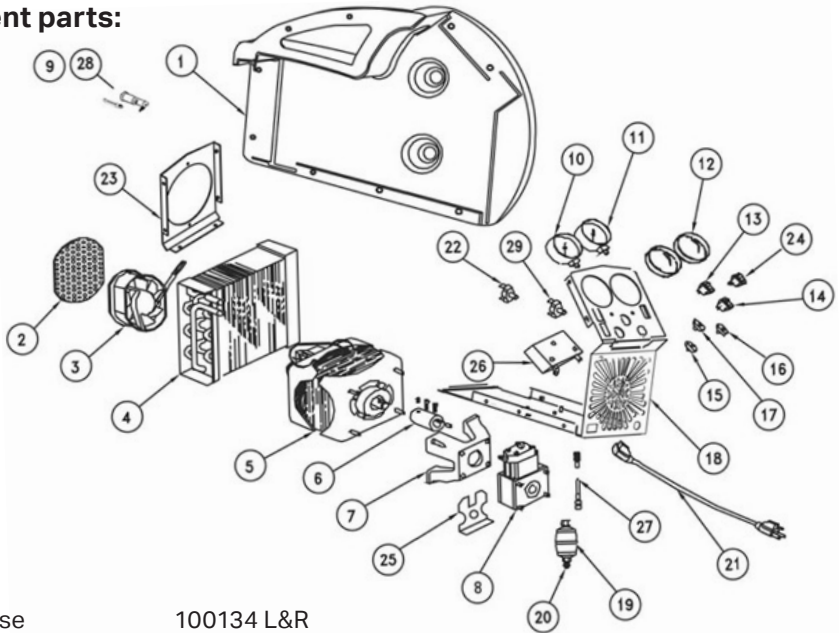


UNITORTM
by Wilhelmsen



9.1. REFRIGERANT RECOVERY UNIT

Replacement parts:

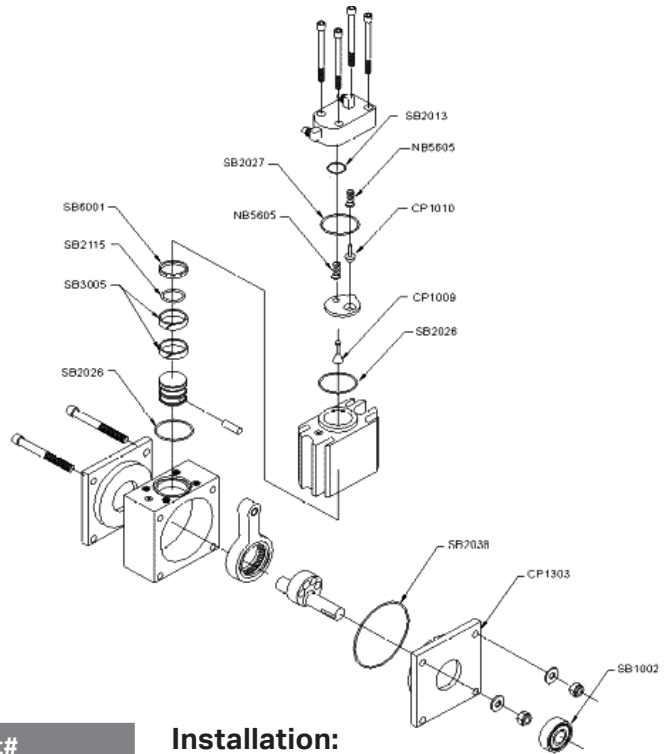


① Plastic case	100134 L&R		
② Fan grill	100505	①⑥ Red knob	100124
③ Axial Fan	EL1818	①⑦ Black knob	100122
④ Condenser	CD1201	①⑧ Frontpanel	110-200395-001
⑤ Motor	EL1822	①⑨ Filter	100343
⑥ Coupler	CP1315	②⑦ Flare cap	NB6501
⑦ Bell housing	CP1001	②① Powercord	135-200341-001
⑧ Compressor	CP1320	②② High pressure switch	100339
⑨ Fuse – 5 x 20 mm	110-200347-001	②③ Rear Panel	100318
⑩ Input gauge	GA1500	②④ Select Switch	105-200396-001
⑪ Output gauge	GA0800	②⑤ Compressor Bracket	100207
⑫ Gauge lens	GA1000	②⑥ Manifold	535395ASM
⑬ ON/OFF switch	EL1310	②⑦ Hose 4"	100345
⑭ Start switch	EL1309	②⑧ Fuse holder	100419
⑮ Blue knob	100123	②⑨ VAC sensor	113726

Compressor repair kit: URU 3305

Removal:

Remove compressor from URU-50000. Remove the seal plates (CP 1303). Remove 4 cylinder head bolts, remove cylinder, head and O-ring. Slide cylinder straight up off of the piston. Remove the piston seal, O-ring and 2 slide rings from the piston. Remove the seal plates. Remove the crank shaft and inspect for any foreign material. Remove existing bearings and shaft seals from seal plates.



This kit includes:

QTY.	Description	Part#
2	Shaft bearing	SB81002
2	Shaft seal	SB5202
2	#038 O-Ring	SB2038
2	#026 O-Ring	SB2026
2	Slide ring	SB3005
1	#115 O-Ring	SB2115
1	Piston seal	SB6001
1	Input valve	CP1009
1	Output valve	CP1010
2	Valve spring	NB5605
1	#013 O-Ring	SB2013
1	#027 O-Ring	SB2027

Installation:

Install #115 O-ring in top piston groove. Install piston seal over #115 O-ring. Install new bearings and seals into the seal plates and replace the cir-clips. Reinstall crank shaft and compressor seal plates ensuring that the crank shaft is oriented correctly. Place one #026 O-ring into the groove of the top of the compressor body, slide the cylinder onto the piston while holding the two slide rings in place. Note that the bottom of the cylinder is the end that is radiused on the inside the square end is the top. Place the other #026 O-ring into the valve plate and reinstall the cylinder head, tightening the 4 bolts in a cross pattern. Reinstall the compressor, pressure up the machine and check for leaks.



Product range:

Unitor marine refrigerant recovery units

Description	Product#	Note#
Refrigerant Recovery Unit URU-5000A	613748	230V 50/60Hz
Refrigerant Recovery Unit URU-5000B	613747	115V 50/60Hz

The Unitor Marine Refrigerant Recovery Unit is supplied ready to operate with a user manual.

Recovery hoses, recovery cylinders and spare parts are not included and must be purchased separately.

Description	Product#	Note#
Recovery unit connection kit	613935	
Recovery cylinder 56L + documents	632588	
Deluxe manifold set 4-way*	711473	
Digital weighing platform ADS-100*	613927	100 kg

*included in refrigerant recovery package (652522 / 652511).

Spare parts

Description	Product#	Model#
Inlet filter drier	636738	URU-032F
Compressor repair kit	613885	URU-3305



9.2. VACUUM PUMP

To maintain your high vacuum pump:

For maximum performance, it is recommended to change the vacuum pump oil after each use.

Vacuum pump oil

The condition and type of oil used in any high vacuum pump are extremely important in determining the ultimate attainable vacuum. It is recommended to use only high quality vacuum pump oil.

Oil change procedure

1. Be sure the pump is warmed up.
2. Remove the OIL DRAIN cap. Drain contaminated oil into a suitable container and dispose of properly. Oil can be forced from the pump by opening the inlet and partially blocking the exhaust with a cloth while the pump is running. Do not operate the pump for more than 20 seconds using this method.
3. When the flow of oil has stopped, tilt the pump forward to drain residual oil.
4. Replace the OIL DRAIN cap. Remove the OIL FILL cap and fill the reservoir with new vacuum pump oil until the oil just shows at the bottom of the sight glass. The approximate oil capacity of the pump is 375 milliliters.

5. Be sure the inlet ports are capped, then turn ON the pump. Allow it to run for one minute, then check the oil level. If the oil is below the sight glass OIL LEVEL line, add oil slowly (with the pump running) until the oil reaches the OIL LEVEL line. Replace the OIL FILL cap, making sure the inlet is capped and the drain cap is tight.

6. If the oil is badly contaminated, you may need to flush your pump. To flush, remove the pump drain cap and start the pump. Slowly pour a small quantity of new pump oil through the oil fill inlet. Repeat this procedure as required until the contamination is removed. Replace the OIL DRAIN cap and refill the reservoir to the proper level with fresh pump oil (see Step 4).

Cleaning your pump

Clean the pump with soap and water only. Do not use commercial cleaners that contain degreasing agents that can damage polycarbonates. The pump handle and base are made of Lexan, one of the toughest polycarbonate plastics available. However, it is sensitive to degreasing agents. *Lexan is a registered trademark of General Electric

Motor Lubrication

After three years of normal service or one year of heavy-duty service, add oil annually. Use electric motor oil or SAE 10 oil.

Troubleshooting guide:

Your Vacuum pump has been designed for dependable use and long life. If something should go wrong, however, the following guide will help you get the pump back into service as quickly as possible. If disassembly of the pump is required, please check your warranty. The warranty may be voided by misuse or customer tampering which results in the pump being inoperable.

Failure to start

Check the line voltage. Vacuum pumps are designed to start at $\pm 10\%$ line voltage (loaded) at 0° C. At extremes, however, switching between the start and run windings may occur. When starting the pump in cold temperatures, be sure the Iso-Valve and inlet port are open to free air.

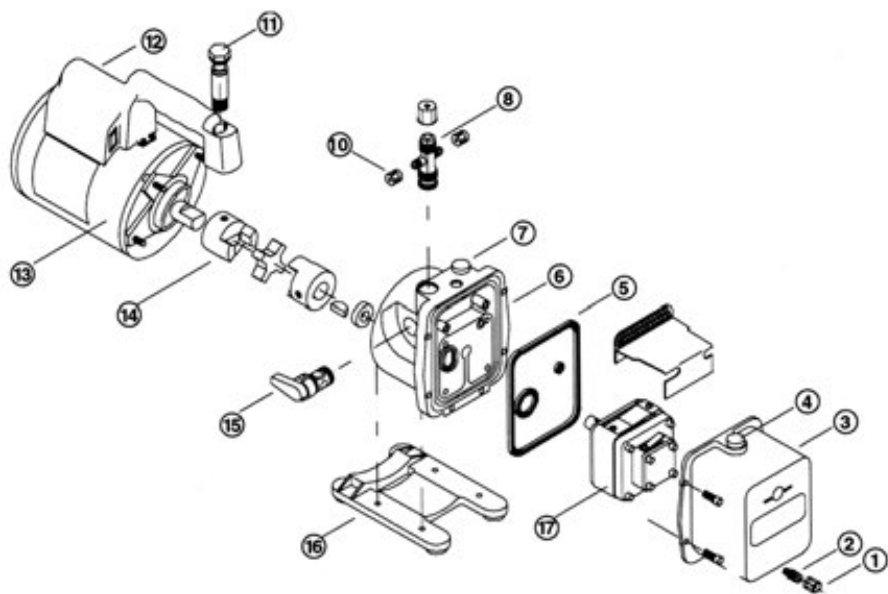
Oil leakage

1. Be sure the oil is not a residual accumulation from spillage, etc.
2. If leakage exists, the module cover gasket or the shaft seal may need replacing. Follow the instructions supplied with the seal replacement kit, part number 15367.

If leakage exists in the area of the drain plug, you may need to reseal the plug using a commercial pipe thread sealer.

Failure to pull a good vacuum

1. Be sure the Iso-Valve on the pump is in the OPEN position and the gas ballast knob is tightly sealed.
2. Be sure the vacuum gauge and all connections are in good condition and leak-free. You can confirm leakage by monitoring the vacuum with a thermistor gauge while applying vacuum pump oil at connections or suspected leak points. The vacuum will improve briefly while the oil is sealing the leak.
3. Be sure the pump oil is clean.
A badly contaminated pump may require several oil flushes. See OIL CHANGE PROCEDURE.
4. Be sure the oil is at the proper level. For maximum pump operation, the oil must be even with the OIL LEVEL line on the sight glass when the pump is running. See OIL CHANGE PROCEDURE. Do not overfill - operating temperatures will cause the oil to expand so it will appear at a higher level than when the pump is not running. To check the oil level, start the pump with the inlet capped. Check the oil level in the sight glass. Add oil if necessary.



Replacement parts:

② Oil Drain Kit (includes No. 1)	13193	⑫ Handle, Power Cord and Switch Assembly	15466
③ Module Cover Kit (includes No. 2, 4 and 5)	15337	⑬ Motor	15465
④ Oil Fill Cap (includes No. 7)	15371	⑬ Coupling	13192
⑧ Intake Fitting (includes No. 9 and 10)	15364	⑭ Iso-Valve™ Assembly	15368
⑪ Vent Bolt (includes O-rings)	15338	⑮ Base and Foot Assembly	15369
		⑯ Pump Assembly, less motor (includes No. 3 and 6)	15547
		⑰ Seal Replacement Kit (not shown)	15367



9.3. REFRIGERANT LEAK DETECTOR

Maintenance:

Proper maintenance of your Leak Detector is very important. Carefully following the instructions, outlined below, will reduce performance problems and increase the life expectancy of the unit.

 **WARNING: turn unit off before replacing the sensing tip. failure to do so may result in a mild electrical shock!**

Keep the sensing tip clean: Prevent dust, moisture and grease build-up by utilizing the provided tip protector. Never use the unit without the protector in place.

Before using the unit always inspect the tip and protector to see that they are free of dirt and / or grease. To clean:

1. Remove protector by grasping and pulling off tip.
2. Clean protector with shop towel and / or compressed air.
3. If the tip itself is dirty it can be cleaned by immersing in a mild solvent, such as alcohol, for a few seconds, and then using compressed air and / or a shop towel to clean.

 **NOTE: never use solvents such as gasoline, turpentine, mineral spirits, etc... as these will leave a detectable residue and desensitize your unit.**

Sensing tip replacement

The tip will eventually wear out and require replacement. It is difficult to predict exactly when this will occur since tip longevity is directly related to the conditions and frequency of use. The tip should be replaced whenever the alarm sounds or becomes erratic, in a clean, pure, air environment.

To replace the tip

1. Make sure the unit is OFF.
2. Remove the old tip by unscrewing counter-clockwise.
3. Use the supplied replacement tip, located in the carrying case. Replace by screwing on clockwise.

Replacement parts:

Standard Equipment

Your Refrigerant Leak Detector comes equipped with one Carrying Case, one Owner's Manual, and one replacement Sensing Tip.

To purchase replacement parts for you leak detector please contact your local distributor. To ensure that you obtain the correct parts it is best to reference the part number when placing your order.

Replacement Parts

Part#: Part Description

XP-2: Maintenance Kit, 3 Sensing Tips,
3 Tip Protectors

Specifications:

Power supply	3 V DC; two „C“ cell alkaline batteries
Maximum sensitivity	per SAE J1627 rating criteria certified @ 0.5 oz / yr. (14 gr / yr)
Ultimate sensitivity	less than 0.25 oz / yr (7 gr / yr) for all halogen based refrigerants
Sensing tip life	approximately 20 hours
Operating temperature	30° - 125° F (0° to 52° C)
Battery life	approximately 30 hours normal use
Duty cycle	continuous, no limitation
Response time	instantaneous
Reset time	1 second
Warm-up time	approximately 2 seconds
Unit weight	1.2 pounds (560 grams) (with batteries)
Unit dimensions	9" x 2.5" x 2.5" (22.9 cm x 6.5 cm x 6.5 cm)
Probe cord length	14" (35.5 cm)

Warranty & repair:

This instrument has been designed and manufactured to provide unlimited service. Should the unit be inoperative, after performing the recommended maintenance, a no-charge repair or replacement will be made to the original purchaser. This warranty applies to all repairable instruments that have not been tampered with or damaged through improper use. This warranty does not cover batteries, sensing tips, tip protectors, or any other materials that wear out during normal operation of the instrument.

Before returning your instrument for repair please make sure that you have careful-

ly reviewed the Unit Maintenance section of this manual to determine if the problem can be easily repaired. Make sure that you have either replaced or cleaned the sensing tip and tip protector and that the batteries are working properly BEFORE returning the unit. If the instrument still fails to work properly please call your local distributor.



9.4. DELUXE MANIFOLD

Service of manifold:

- The charging hoses must be checked and clean of oil residue before each use. A visible control is also necessary to ensure that the hoses and the connection are undamaged and tight.
- The seals and gaskets of the manifold are parts of use and must therefore be replaced from time to time. The manifold must be tested regularly to ensure the valves are tight.
- If a manifold shows to be leaking, the pistons of the valves can easily be changed and are available as a spare part. Please refer to the manifold accessory section of the REFCO catalogue.
- If the sight glass is leaking a replacement kit is available. To change the sight glass a special tool is necessary (M4-6-11-T, Part No. 4493169) which is also available from REFCO. Replace and tighten the new sight glass carefully in order to prevent damaging the glass.
- To change the valve core on models with t-style or vacuum gauge connection, use a valve core screw driver A-32000 from REFCO.
- **After changing spare parts on the manifold it is absolutely necessary to test the manifold for tightness before the next use.**

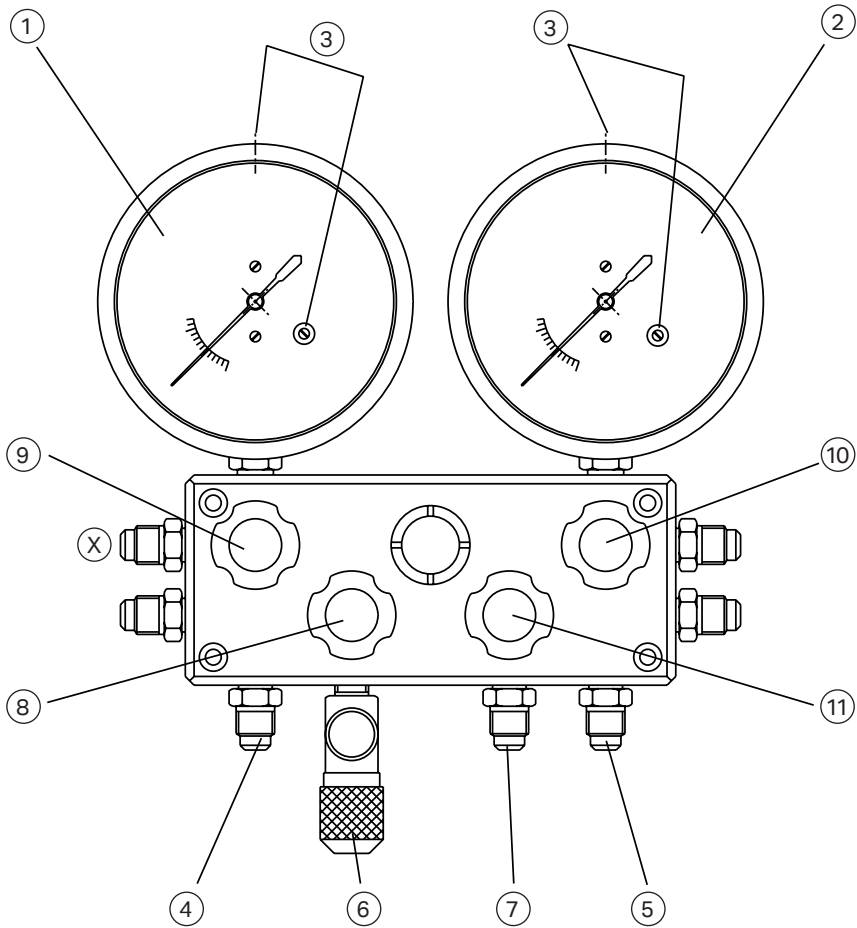
Disposal of manifold:

- Dispose of the manifold according to the rules and regulations of the country of use.

Spare Parts for manifold:

Repla- cement knobs	M4-7-SET- B+N+R+Y	Part no. 4687094
Complete valve set (4 pcs.)	M2-10-95- R/4	Part no. 4687105
Piston incl. Gasket (4 pcs.)	M4-6-04- R/4	Part no. 4687093
Assembly of sight glass	M4-6-11	Part no. 4491018
Tool for sight glass	M4-6-11-T	Part no. 4493169
Plastic case	M4-6-14	Part no. 4678431
Plastic case / Multi case	M4-6-15	Part no. 4666106

Parts List:



Index:

- | | |
|-----------------------|--|
| ① compound gauge | ⑦ refrigerant connection |
| ② pressure gauge | ⑧ vacuum valve |
| ③ adjusting screw | ⑨ compound valve |
| ④ compound connection | ⑩ pressure valve |
| ⑤ pressure connection | ⑪ refrigerant valve |
| ⑥ vacuum connection | (X) Possible connection for vacuum gauge |



9.5. DIGITAL VACUUM GAUGE

TROUBLESHOOT:



MEASURING

Problem: The Display shows OOR (Out Of Range).

Action: Reduce the pressure to the Device.



Maintenance:

The digital vacuum gauge requires maintenance when used regularly:

Replace Filter:

The sinter filter can be unscrewed with a slotted screwdriver. Replace the filter whenever it becomes visibly dirty or every 3 to 4 months, depending on use.

Cleaning:

Clean the screen and the housing surface with a cloth and cleaning agent. Do not use corrosive cleaning agents or solvents to clean the unit. Weak household cleaners and mild detergents may be used.

Cleaning the Vacuum Sensor:

It may happen that in rare cases, the vacuum sensor is contaminated with oil, and cleaning is then required.

The following cleaning process must be followed:

1. Remove battery
2. Remove sinter filter

3. Turn the unit upside down with the vacuum connector facing up.
4. Put a few drops of isopropanol into the sensor housing.
5. Place a finger over the connector and close the sensor with it.
6. Shake the instrument for a few seconds.
7. Remove finger and let alcohol out of sensor, shake.
8. Repeat steps 4 to 7 twice.
9. Allow the sensor to dry in ambient air for at least 1.5 hours or draw vacuum for more than 2 minutes.
IMPORTANT: It is imperative that the vacuum sensor is dry!
10. Re-fit the sinter filter. It is recommended to use a new sinter filter.
11. Now the batteries can be inserted and the instrument can be switched on again

Periodic cleaning of the vacuum sensor is not recommended.

Guarantee:

Your new REFVAC has been developed in accordance with the latest findings in occupational physiology and ergonomics. REFCO Manufacturing Ltd has been certified according to DIN EN ISO 9001:2015. Regular quality control checks as well as an accurate manufacturing process guarantee reliable functionality and are the basis for the REFCO guarantee, in accordance with the General Terms and Conditions of Sale and Delivery applicable on the day of delivery. Excluded from the guarantee are damage caused by obvious maltreatment and wear and tear.

Return Disposal :

The REFVAC has been developed for long-term use. Attention was paid to energy saving and environmental compatibility at the material procurement and production stages. REFCO embraces its responsibility towards the environment, and has there-

fore been certified in accordance with DIN EN ISO 14001:2015. When decommissioning the device, the user must follow local disposal regulations. The housing is made of ABS and PC.

Specification:

Property	Value	
Sensor Type	Micro-Pirani Sensor	
Pressure Type	Absolute Pressure	
Accuracy	±5% of reading or ±10 micron: From 10 to 10'000 micron	
	±10% of reading: From 10'000 to 30'000 micron	
	Indication: From 30'000 micron to atm	
Resolution	0.1 micron	(<149.9 MICRON)
	1 micron	(150 – 1'499 micron)
	10 micron	(1'500 – 7'490 micron)
	100 micron	(7'500 – 19'900 micron)
	10'000 micron	20'000 – 760'000 micron)
Pressure Scale	inHg mTorr Torr Pa micron mbar psi	
Pressure Range	atm - 0 micron	
Working Pressure	30 bar	
Temperature Range	-20 °C – 50 °C	
Gas Connection	1/4" SAE	
Battery	3xAAA 3xLR03	
Battery-lifetime	>100 h	
Ingress Protection	IP42	
Packaging	Blister	
Material	ABS PC Brass FR-4	
Colour	yellow (RAL 1023) green (RAL 6026)	
* Wireless communication	Yes	
*Signal range	Up to 100 m	

* REFVAC-RC only



10. DECLARATION OF CONFORMITY





Ships Service

DECLARATION OF CONFORMITY

WILHELMSEN SHIPS SERVICE AS
Strandvein 20, NO-1366
Lysaker, Norway

Date: 21 October 2024

The undersigned herewith declares that capabilities of Unitor Recovery Package

- 652522 Refrigerant Recovery Package (220V)
- 652511 Refrigerant Recovery Package (110V)

Complies with minimum requirements of international environmental legislations:

- IMO/MARPOL 73-78, annex VI (regulation 12, article 1,2,3)
- EU F-Gas Regulations 517/2014
- Clean Air Act 608 (USA)
- Montreal and Kyoto Protocol
- Notations of DNV-GL, LRS, ABS, BV classes
- Flag Administration / National Bodies environmental requirements (EU, USA, Australia, The Netherlands, Sweden, Canada, Germany, India, Russia, etc.)

Unitor Refrigerant Recovery Package carry out agreed minimum duties of recovery equipment, used refrigerant storage, and refrigerant handling equipment, system charging and temporary refrigerant evacuation, system vacuuming, system drying, and tightness verification.

Unitor Refrigerant Recovery Package components were manufactured with rigorous quality control. The design and engineering standards of the recovery package are based on stringent USA and EU norms and protected by patents.

Wilhelmsen Ship Service herewith declares that the below mentioned components of the Unitor Refrigerant Recovery Package are manufactured and conform to the mentioned standards and meet all requirements.

Product Number	Product Description	Applicable standards and (or) patents
613748 / 613747	Refrigerant recovery unit URU-5000A / URU-5000B	EPA notice ARI740; US patent D474,209
587660	Vacuum Pump 115/230V UVP1550-A3	MD 2006/42/EC, EMC 2014/30/EU, RoHS 2011/65/EU
716142	Handheld refrigerant leak detector UNIRX-1A	SAE J1627, EN 55022, 61000-4-2, 61000-4-3, 500082-2, ENV50204
613927	Digital weighing platform ADS-100	EN61000-3-2:2014, EN61000-3-3:2013
711509	Digital vacuum gauge UVG-80	ETSI EN 300 328 V2.2.2 (2019-07), ETSI EN 301 489-1 V.2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) FCC Title 47, Part 15, Subpart B
711473	Deluxe manifold set 4-way	2014 / 68 / EU & EN-837-1
596544	Recovery cylinder empty 21.6L with documents	US DOT 4BA400

Nicholas Neo
Technical Product Manager, Refrigeration





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