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ROBINAIR®

PRODUCT TRAINING

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AC TRAINING AGENDA



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Main Unit

ACM3000ROB-AU

34988NI

AC1X34-3P

13206-KIT

MINIMAX-RA

MINIMAX-RR

13206RT-2D

AC1234-3P

AC1234-7 (Will be replaced with AC1234-7i)

1234YF overview

Manual equipment

Future products and how that fits



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BOSCH

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Robinair – The History



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Introduction of new innovation that has advanced connectivity, functionality and remote control solution through mobile app.

Robinair brand is part of Bosch Automotive Service Solution

A Robinair model was the first one to fulfil the demanding industry standard SAE J2788.

A machine for the entire A/C service on vehicles using refrigerant R134a was introduced

The company patented the first refrigerant recovery and recharging station.

Robinair was Founded
The beginning of more than 60 years of innovation in this industry.



With the increasing popularity of AC for homes, our product line was the most complete in the industry.

The first A/C service unit with microprocessor control functions entered the market.

The company kept improving the safety and environmental friendliness of the special tools in many steps of development.

Robinair was granted the global license to operate the AC1234 air conditioning equipment with the new refrigerant R-1234yf.

Robinair global leader for 1234YF RRR machines



Robinair today is not only *the world market leader in the area of automotive A/C service* but also takes *the lead in HVAC and commercial refrigeration equipment.*



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Robinair - AC Product Range



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Speed, accuracy efficiency and Safety

**The new AC units range for R134a and R1234yf systems:
Service speed, high adaptability and maximum efficiency –
the key for a successful air conditioning service and
maintenance**

Air conditioning systems are part of standard vehicle maintenance routine programs – and it is a matter of fact that mechanics are often obliged to solve problems relating to A/C system efficiency. Troubleshooting requires time and the scarce availability of A/C system data for maintenance best practice and increased refrigerant costs can harm the profitability of your workshop. Innovative A/C equipment designed based on customers' experience is the key to success: the new range of Robinair A/C units perfectly combines unique and different functions and needs – for all workshops.

The new A/C platform with fully-automatic functions offers a wealth of important and exclusive features, such as:

- › 'Deep Recovery', which reduces maintenance times for A/C systems by 20%. A quick return on investment.
- › Efficient and environmentally-friendly use of resources thanks to 99% recovery of the refrigerant from the vehicle.
- › An innovative oil injection system avoids the danger of lubricant cross-contamination and additional repair costs.

*“Robinair – Your
Partner Today and
in the Future”*



Global leader of Automotive Air Conditioning since 1956

As long as there's been air conditioning, there's been Robinair, the global leader in automotive and HVAC/R air conditioning (A/C) refrigerant recovery, recycling and recharge tools, equipment and accessories. Vehicle manufacturers (OEMs), dealership service departments, auto repair shops, industrial and commercial contractors have turned to Robinair for A/C service products since 1956.



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AC TRAINING ACM3000-ROB

Entry level model for air conditioning specialists that is user friendly.

The units carry out automatic refrigerant recovery, recycling, charging and **guarantees the quick, complete drying of the system.**

An **optional printer** is also available to create detailed reports

“A European made unit for the A/C specialists mechanical repair and crash repair industry with all the functions and performance required for professional.”

Automatic AC unit with the fastest Return of Investment



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FUNCTION

- Automatic recovery
- Automatic recycling
- Automatic oil discharge
- Programmable vacuum phase
- Automatic A/C system leak test
- Automatic refrigerant charging
- Programmable maintenance
- Multi-language display
- Super-Cool exchanger
- A/C systems integrated database (optional)
- Automatic purge of non condensable gas

TECHNICAL STRENGTH

Vacuum pump:	70 L/min 2,5CFM
Tank capacity:	8 Kg
Oil tank:	2 x 250 ml
Filter dryer high performance:	300 cc
Compressor:	1/4 HP 9 cc
Refrigerant :	R134a



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ACM3000 set up procedure



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Before it leaves us:

Set time, date and language, update database

Internal components are checked for security and alignment.

scales are checked and calibrated, entire system is vacuumed out ready for first fill of gas.

Add Tank adapter, add lead or plug as required.

On-site:

Fit oil bottles

Fit adaptor to fresh R134a gas cylinder, careful to fit copper washer correctly in base of adapter.

Initial fill of gas, always use tank fill and not recovery, always liquid fill and preferred option from a new bottle of gas. Add min of 4KG on initial fill,

Some gas added will not show on initial fill, this is intentional and serves a purpose.

Check oil level in vacuum pump from site glass.

Basic training for the customer on use of the machine.

Check functionality of the machine during demo / training

Check printer operation if fitted.



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AC1234-3P & AC1x34-3P



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Highlights:

- Visual and acoustic signals in case of error messages and upon completion
 - Professional refrigerant management with evaluation of recovery and charge volume.
 - Intelligent electronic control of refrigerant weight.
 - Safety guaranteed and certified for R1234yf use
 - Service hoses flushing, conforming to SAE J2843, allows the maintenance of A/C systems for hybrid or electric vehicles
 - Integrated flushing program combined with optional flushing kit.
 - Management and storage of the amount of refrigerant used
 - Automatic purge of non condensable gas
 - Easy to use: These automatic units do the hard work for you.
- With limited instructions you will be able to start using this unit professionally.



AC1234-3P (SP0100002): Fully automatic AC unit R1234yf with Printer
AC1x34-3P (SP0100014): Fully automatic AC unit R134a with Printer (Convertible)



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AC1x34-3P set up procedure



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Before it leaves us:

Set time, date and language

Check and calibrate fan, check and adjust oil injection (new)

Add tank adapter, lead or plug as required.

On-site:

Fit oil bottles

Activation of machine including customer registration.

Follow the on screen prompts for initial set up, please don't skip any steps.

Fit adaptor to fresh R134a gas cylinder, careful to fit copper washer correctly in base of adapter.

Initial fill of gas, always use tank fill and not recovery, always liquid fill and preferred option from a new bottle of gas. Add min of 4KG on initial fill.

Some gas added will not show on initial fill, this is intentional and serves a purpose.

Check oil level in vacuum pump from site glass.

Check that oil calibration factor is set to 0.12 (best for PAG68)

Run a hose flush, this will help settle the machine prior to first use.

Basic training for the customer on use of the machine.

Check functionality of the machine during demo / training



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AC790 PRO

The specialist for large air conditioning systems



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- Automatic service process
- Single service process selectable
- Fast and Deep vacuum (vacuum pump 283 l/min)
- Large oil canister (2000 ml)
- Large internal tank (40 KG)
- Long service hoses standard (5m)
- Liquid pump for charge oil and refrigerant
- Integrated database for both trucks and commercial vehicles
- Integrated flushing program with optional kit
- Multi-phase refrigerant recycling during vacuum phase
- Integrated, guided performance test for A/C system
- Automatic purge of non condensable gas
- Easy internal filter maintenance
- Accessible vacuum pump for easy oil change
- Printer



Automatic air conditioning service unit for heavy duty



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AC 790 pro set up procedure



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Before it leaves us:

Set time, date and language.

Fit internal cylinder.

Add Tank adapter, add lead or plug as required.

On-site:

Fit oil bottles

Fit adaptor to fresh R134a gas cylinder, careful to fit copper washer correctly in base of adapter.

Initial fill of gas, always use tank fill and not recovery, always liquid fill. Add min of 8KG on initial fill,

Some gas added will not show on initial fill, this is intentional and serves a purpose.

Check oil level in vacuum pump from site glass.

Run a short re-cycle (5 min), this will help to settle the machine ready for first use.

Basic training for the customer on use of the machine.

Check functionality of the machine during demo / training



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AC TRAINING INTRODUCING...



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*“The new Robinair Premium A/C Machine combines
EASE OF USE and SUPERIOR ACCURACY. It
recovers, recycles, evacuates, leak tests & recharges
R-134a vehicle systems quickly and accurately.”*



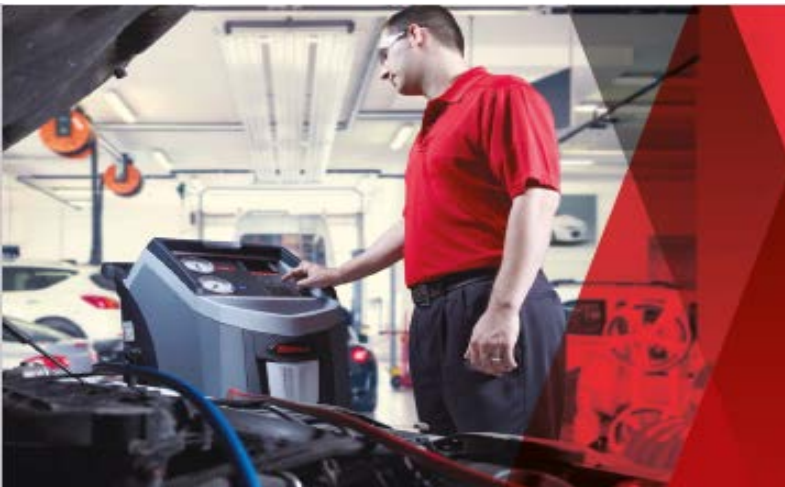
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AC TRAINING 34988NI AT A GLANCE

*“Premium A/C Machine combines ease of use and superior accuracy, unmatched **98.5% recovery.**”*



- ❖ **Fully SAE J2788 compliant and exceeds the requirements** for charge accuracy and recovery efficiency.
- ❖ **Certified SAE J2788.**

- Fully automatic recovery, vacuum leak test and recharge - no monitoring required from emptying supply tank automatic top up
- Deep recovery
- Automatically add oil if necessary using load cells that measure the amount of oil removed from the system and automatically putting the right amount of A/C lubricant back into the system, make the 34988NI the a true fully automatic machine available today.
- Two oil inject bottles for different oils to work on more vehicles with less down time (electric / hybrid compatible)
- Capability to inject UV dye into the vehicle's A/C system for leak detection and making any future maintenance easier.
- Automatic air purge eliminates system-damaging air
- Large easy-to-read color display and printer standard



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AC TRAINING 34988NI



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Specification

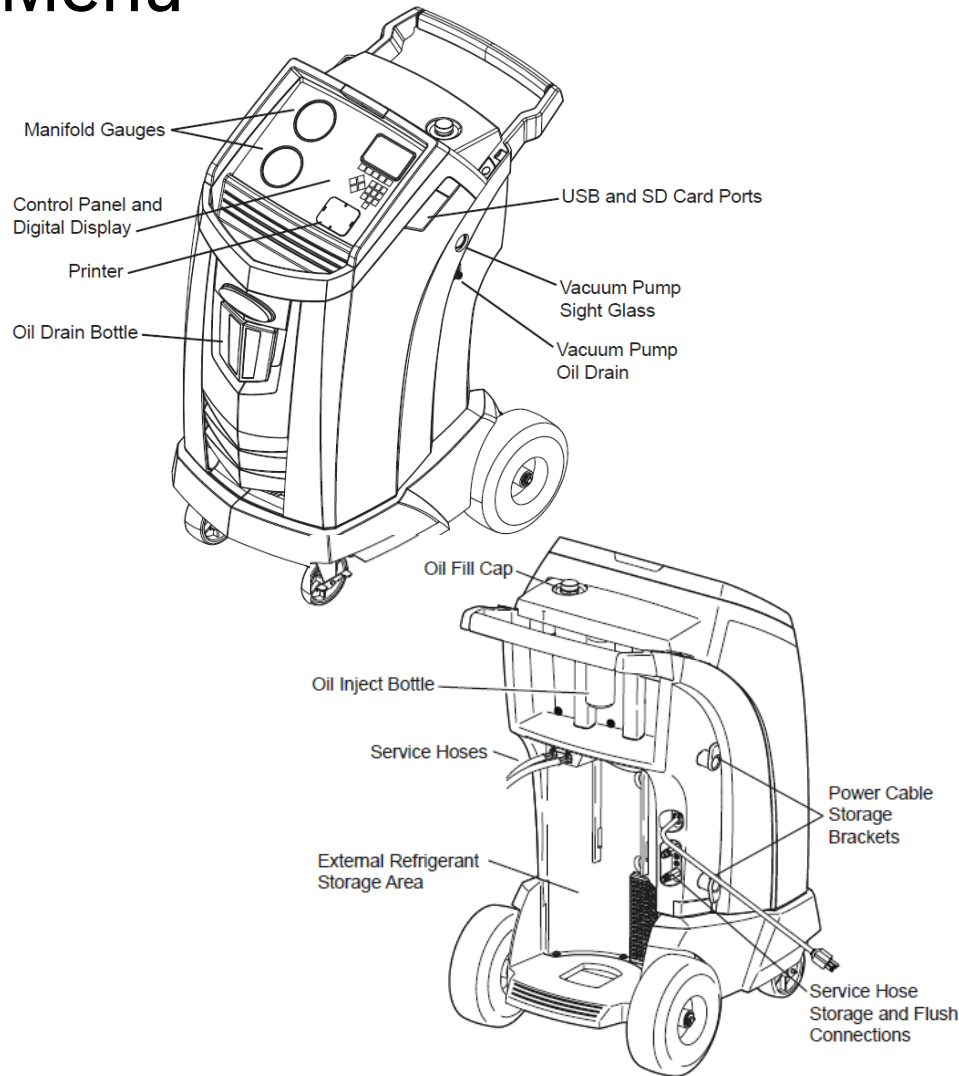
Operating Temperature	0°-50°C
Storage Temperature	-18 to 66°C
Recovery Performance	>95% at 21 to 24°C <30 minutes
Charge Performance	+/- 14g at 21° to 24° C
Compressor	3/8 hp, pressure protected, oiled, hermetically sealed
Vacuum Pump	35 lpm Dual Stage, 29.9 InHg
Hoses	2.5 m
Filter Life	68 kg, spin-on type
Internal Cylinder	10 KG.
Operating Voltage	230VAC 50 Hz
Display	7 in. LCD graphical display
Refrigerant Removal	98.5% within 30 minutes at 21°C Accuracy: 30 g (±1.0 oz.)
Certifications	SAE J2788



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Menu



Control Panel Functions



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ALPHA-NUMERIC KEYPAD allows the user to enter data when called for by the machine.

ARROW UP moves selection of a menu item to the previous item; turns up audio volume.

ARROW LEFT scrolls to the previous screen; rewinds the video.

ARROW RIGHT scrolls to the next screen;.

ARROW DOWN moves selection of a menu item to the following item.

FUNCTION KEYS (Five up-arrows beneath the display) select the symbols as noted below to step through the tests of the unit being serviced.



DATABASE supplies information regarding charge capacity by vehicle model.



AUTOMATIC activates a menu that helps the user set up an automatic recover/vacuum/leak test/charge sequence.



RECOVER activates the sequence to recover refrigerant from the vehicle A/C system.



VACUUM activates the sequence that pulls a deep vacuum on the vehicle A/C system to remove air and moisture.



CHARGE activates the sequence that charges the vehicle A/C system with a programmed amount of refrigerant.



STOP/PAUSE interrupts the active function. Press once to pause, twice to terminate.



BACK returns the test sequence to the previous screen.



HELP displays information related to the current display.



MENU returns the display to the main menu.

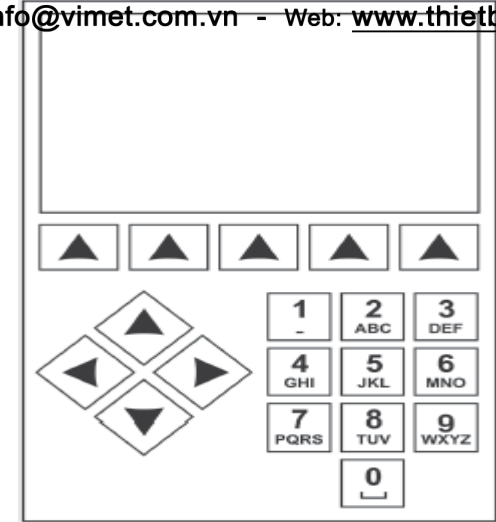


Figure 1-2. Control Panel Keyboard



PRINT activates the printer to print system data.



ON/OFF used to toggle a setting in the routine and selected portions of the unit.



RETRY or **REFRESH** allows a test or step to be repeated.



EXIT or **NO** is used to return to a menu or abort a test.



NEXT allows the operator to move to the next screen or step.



OKAY, **YES**, or **ACCEPT** locks in the values or results and moves the display to the next frame.



OIL BOTTLES allow the operator to select additional oil during the charge process.



BACKSPACE allows text correction when editing print header.



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Deep Recovery

This is a patented process exclusive to robinair and Bosch automatic AC service equipment.

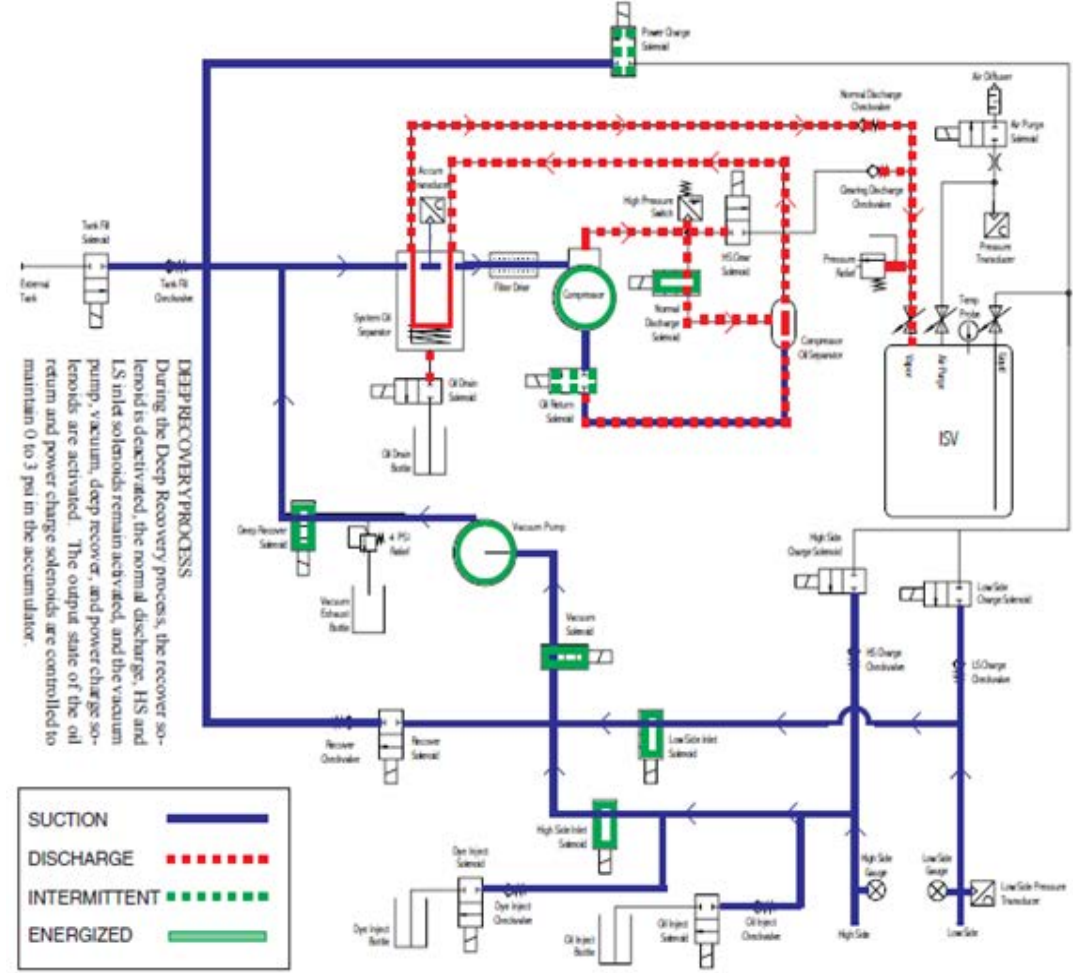
Deep recover uses the compressor in tandem with the compressor to achieve a deep recovery and evacuation of the AC system quickly and complete. The SAE standard J2788 requires 95% recovery of the available refrigerant in the system, our deep recovery process recovers 98%-99% of available refrigerant in the fastest time of any machine on the market. Non SAE J2788 compliant machines and manual equipment can be as low as 60% recovery



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DEEP RECOVERY SYSTEM



DEEP RECOVERY PROCESS
 During the Deep Recovery process, the recover solenoid is deactivated, the normal discharge, HS and LS inlet solenoids remain activated, and the vacuum pump, vacuum, deep recover, and power charge solenoids are activated. The output state of the oil return and power charge solenoids are controlled to maintain 0 to 3 psi in the accumulator.

Deep Recover



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Cost per service

If we look at R134a and place an average cost @ \$30 per KG

An Average size system of 800G , we don't recover and recycle

gas cost \$24

Same system recovered @ 60% recovery, recycle and re-use

gas cost \$14

Same system recovered @ 98% recovery, recycle and re-use

gas cost \$0.5

20 services per week, no recycle and reuse

gas cost \$480

20 services per week, with 60% recycle and reuse

gas cost \$280

20 services per week, with 98% recycle and reuse

gas cost \$10

20 services per week @ \$200

\$4,000

20 services per week, with 98% recycle and reuse

material cost \$10

15 hrs labour at cost of a tech @50 ph

labour cost \$750

Return on investment week 1

\$3240

Now consider the labour time saved by using a fully automatic machine vs a technician, who is now replacing brake pads while the AC is being serviced.

Can you afford not to have one of our machines?



34988NI set up procedure



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Before it leaves us:

Add Tank adapter, add lead or plug as required, add database card.

On-site:

Fit oil bottles

Activation of machine including customer registration.

Follow the on screen prompts for initial set up, please don't skip any steps.

Show the customer how to enter shop info or do it as part of setup.

Fit adaptor to fresh R134a gas cylinder, Initial fill of gas, always use tank fill and not recovery, always liquid fill and preferred option from a new bottle of gas. Add min of 4KG on initial fill.

Some gas added will not show on initial fill, this is intentional and serves a purpose.

Check oil level in vacuum pump from site glass.

Run a hose flush, this will help settle the machine prior to first use.

Basic training for the customer on use of the machine.

Check functionality of the machine during demo / training



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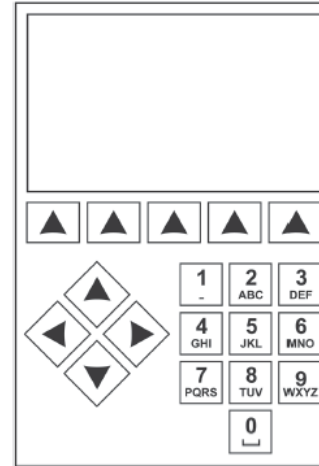
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AC TRAINING 34988NI



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Control Panel Keypad

Getting start →

- Select language
 - Select units
 - Set date and time
 - Edit printer header
- (For more information, visit User Manual and Service Manual)

ARROW UP highlights the previous item
ARROW DOWN highlights the following item

ARROW RIGHT scrolls to next screen
ARROW LEFT scrolls to previous screen

SELECTION ARROWS make a selection or answer a query



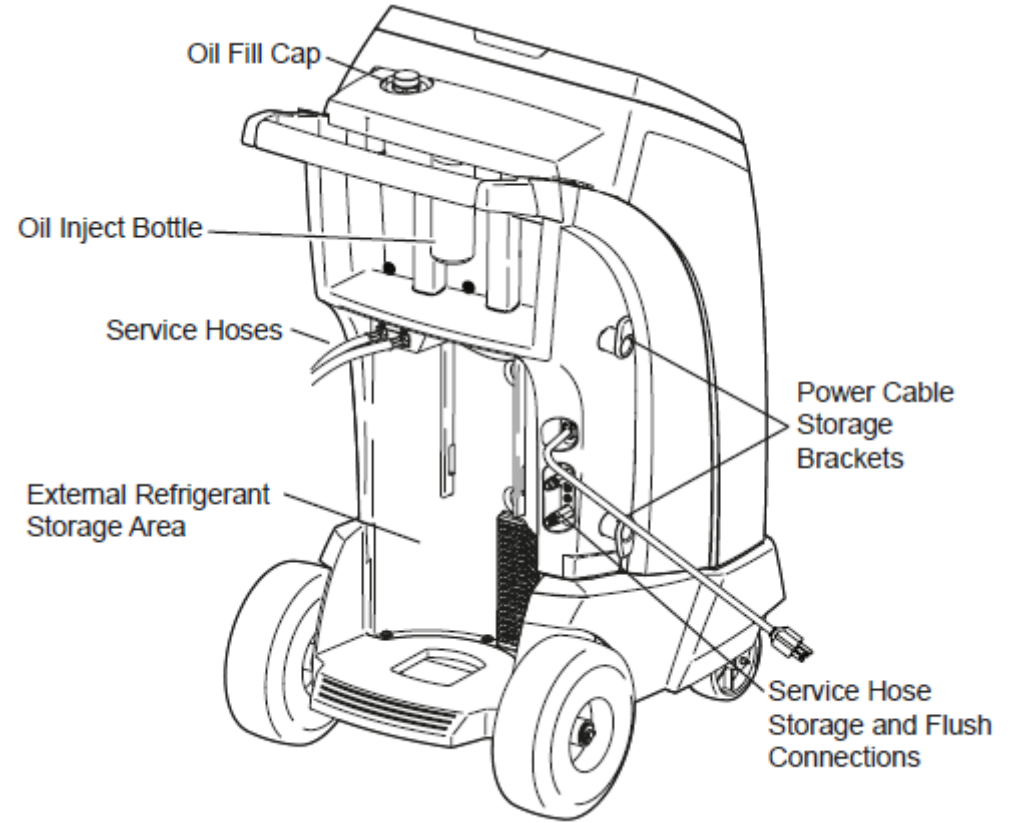
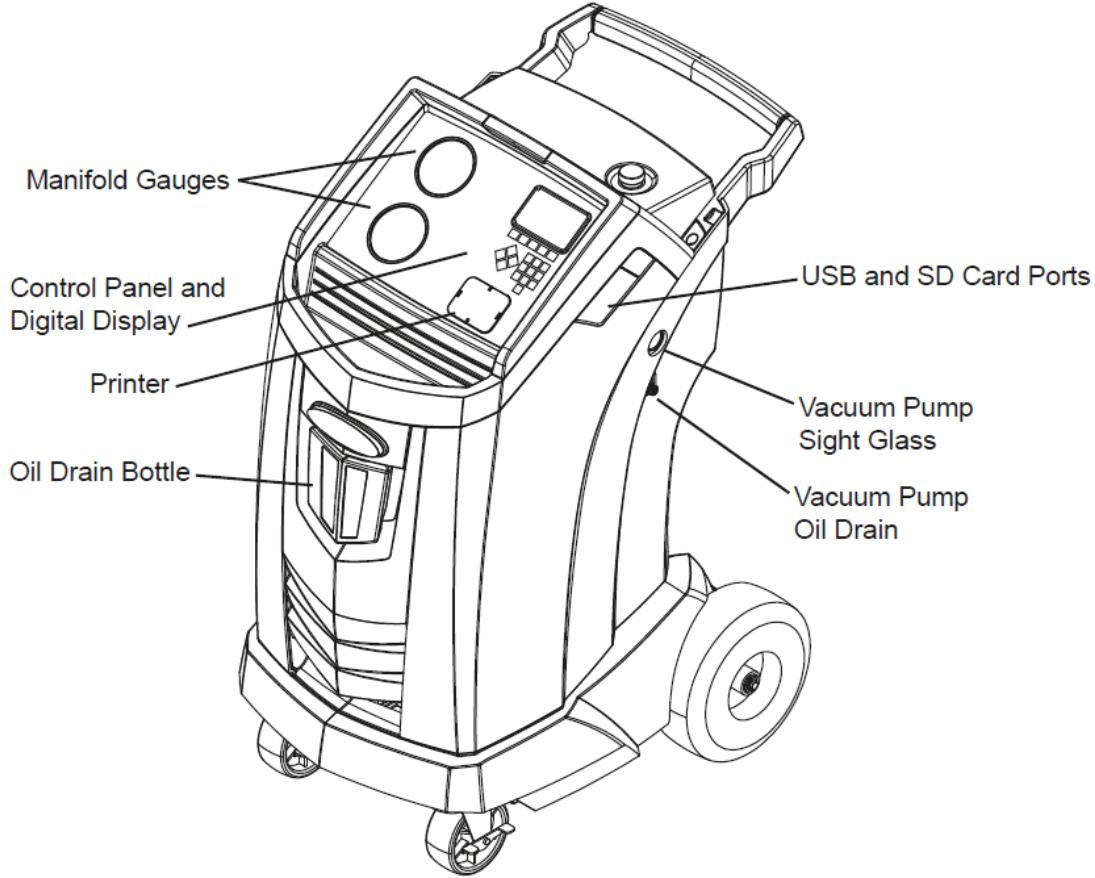
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ROBINAIR 1234YF



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- ▶ The change to a new refrigerant first began with a new European Directive = 2006/40/EC
- ▶ This new directive banned using hydrofluorocarbons (HFCs) with a global warming potential(GWP) number higher than 150.
- ▶ R134a has a GWP number of 1430
- ▶ The new directive went into effect January 1, 2011 (latter amended to 1 Jan 2013)
- ▶ It affects only new vehicle models(platforms) introduced after January 1, 2011.
- ▶ The directive also states that by 2017, all new vehicles sold will be required to use a low GWP refrigerant

- ▶ Why R1234yf
- ▶ It has a low GWP = 4 (which meets the “below 150” requirement)
- ▶ Other advantages it has over other alternatives that were being considered:
- ▶ OEMs don’t need to completely redesign the A/C system.
- ▶ Operating pressures and refrigerant characteristics are pretty close to R134A.
- ▶ Lower energy consumption due to higher energy efficiency which helps achieve better vehicle fuel economy
- ▶ Less energy being consumed to run the vehicle’s A/C system



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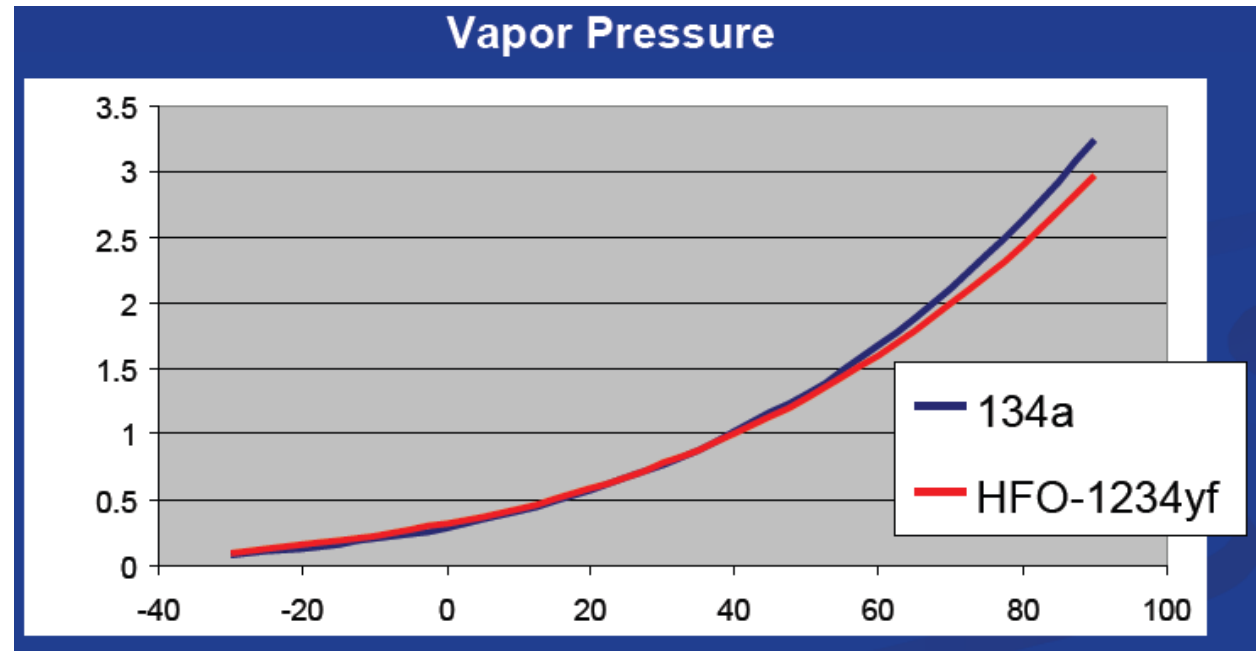
ROBINAIR R1234YF



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Properties	<u>1234yf</u>	<u>134a</u>
P_{vap} , MPa (25°C)	0.677	0.665
P_{vap} , MPa (80°C)	2.44	2.63
GWP (100 ITH)	4	1410
Toxicity	A-Low	A-Low
Flammability	Mild	None



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- ▶ Since R1234yf is classified as mildly flammable new equipment is needed to address safety concerns that arise when working with the refrigerant
 - New SAE requirements for A/C service equipment, couplers, leak detectors, and refrigerant identification equipment.
- ▶ New procedures are added to service operations to ensure service is done properly and limits potential for errors
- ▶ AC1234 is the first Robinair air conditioning service station to conduct maintenance and service on mobile air conditioning systems (MAC) that use the new refrigerant R-1234yf.
- ▶ Developed in conjunction with car manufacturers, this unit meets the highest standards in performance, safety and efficiency. working with a global engineering team, Robinair has brought all its experience to bear in this unit. This ensures that R-1234yf-based air conditioning systems are serviced in the most efficient and most reliable way possible, giving you peace of mind.
- ▶ The unit is designed to be very safe: it will only operate after having successfully completed a thorough self-check.

ROBINAIR AC 1234-7



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- ▶ Automatic unit, does the hard work for you
- ▶ Electronic scales – ensuring accurate, efficient oil/UV dye recovery & injection
- ▶ Large color display, with more than 20 languages available
- ▶ A/C database – so it automatically injects exactly the right amount of refrigerant
- ▶ Training video and help function – no need to read the manual or get any special training
- ▶ Designed for minimum maintenance and maximum serviceability – vacuum pump oil and internal filter are simple to replace, saving you time and hassle
- ▶ Oil/dye injection bottles are easily accessible, thanks to magnetic connectors
- ▶ Large and readable gauges to check A/C system pressure
- ▶ Electronic pressure AC system check
- ▶ Automatic tank refill



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ROBINAIR R1234YF

DEEP RECOVERY SYSTEM

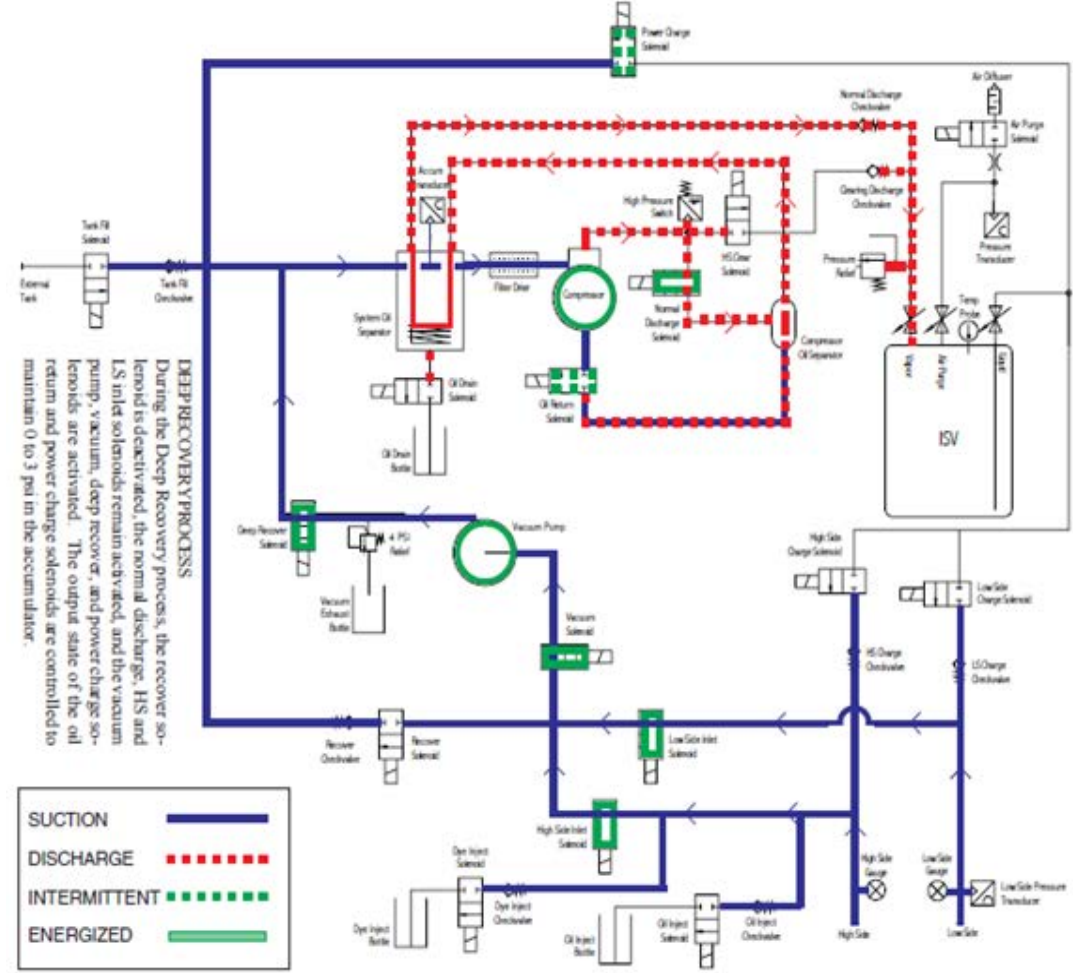


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This is a patented process exclusive to robinair and Bosch automatic AC service equipment.

Deep recover uses the compressor in tandem with the compressor to achieve a deep recovery and evacuation of the AC system quickly and complete. The SAE standard J2843 requires 95% recovery of the available refrigerant in the system, our deep recovery process recovers 98%-99% of available refrigerant in the fastest time of any machine on the market. Non SAE J2843 compliant machines and manual equipment can be as low as 60% recovery



Deep Recover



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DEEP RECOVERY why so important



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If we look at R1234YF and place an average cost @ \$300 per KG

An Average size system of 500G , we don't recover and recycle

material cost \$150

Same system recovered @ 60% recovery, recycle and re-use

material cost \$60

Same system recovered @ 98% recovery, recycle and re-use

material cost \$3

20 services per week, no recycle and reuse

material cost \$3000

20 services per week, with 60% recycle and reuse

material cost \$1200

20 services per week, with 98% recycle and reuse

material cost \$60

20 services per week @ \$250

\$5,000

20 services per week, with 98% recycle and reuse

material cost \$60

15 hrs labour at cost of a tech @50 ph

labour cost \$750

Return on investment week 1

\$4190

What about warranty? Potential material cost of \$3 per repair vs \$150

Now consider the labour time saved by using a fully automatic machine vs a technician, who is now replacing brake pads while the AC is being serviced.

Can you afford not to have one of our machines?



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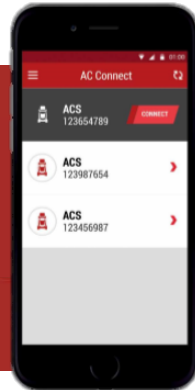
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Highlights of new AC generation



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ACS premium products with special functionality for hybrid and electric vehicles air conditioning maintenance



“A/C units from Robinair – mechanics 1st choice”



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AND!AMO AC1234-7i



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The BEST in CLASS in R1234yf
air conditioning service units!

Highlights:

- Optional refrigerant identifier
- 99 % recovery rate (Deep Recovery)
- Mobile app
- Dual stage vacuum pump (170l/min)
- N2H2/N2 leak test embedded
- Premium accuracy: 15 grams charge accuracy
- Embedded A/C system vehicle database
- Compatible with Bosch Connected Repair and Asanetwork
- Quick and easy access to internal components
- Innovative PAG/POE oil injection
- Select between fully automatic service mode or single service mode
- No manual valves



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Highlights of new AC generation



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Innovative graphic user interface with large high-pressure and low-pressure gauges placed on a swiveling control console. For easy reading and control of parameters under all ambient lighting conditions.



Wide range of accessories that come or can be integrated according to the model configuration. Nitrogen/Tracer gas kit, flushing kit to make your AC unit a complete station for diagnosis and AC system service repair.



The danger of cross-contamination (PAG/POE) lubricants is avoided thanks to the independent oil injection system, user-fillable sealed bottles, and the flushing cycle of the service hoses which is automated at every oil change.



The product has been developed according to a modular design principle of use and approach with easy access to internal components for reduced AC maintenance time.



Robinair dual-stage vacuum pump with the highest flow rate on the equipment market (170 L / min) to guarantee faster and, above all, deeper dehydration of the A/C system.



First remote control solution through **real time mobile application** resulting in more flexibility for the technician



The new units are compatible with **Connected Repair & workshop networks** to **increase efficiency** by digital process integration and internal data exchange inside the workshop



Thanks to **design-for service approach** maintenance & service can now **quickly and easily** be conducted

99%

Thanks to the **Deep Recovery function 99%** of the refrigerant can be recovered **within minutes**. This saves besides time also costs and protects the environment



Easy access to remote service assistance for expert support and know how in no time



AC TRAINING

Highlights



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MOBILE APP OPERATED

The new smartphone app allows the user to check the ACS equipment status in real time and receives push notifications when the service is about to be completed or in case a problems appears. The user can check how much time the service still needs and is able to focus on other repair cases in the meantime.



MULTIFUNCTIONAL

These ACS units integrate all maintenance functions, whether routine or extraordinary. Contextual shortcut help messages support and guide the user through the operations.



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Highlights



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CONNECTED WORKSHOP READY

The units seamlessly connect with Bosch Connected Repair or Asanetwork via WiFi, and stores all service data in one location.

Via Bosch Connected Repair, the workshop owner is now able to document the time and refrigerant spent in a visual and standardized format to the customers.

A SINGLE SERVICE HATCH

Via a single service hatch on the back of the unit, the user or service technician is now able to access the most vital service parts and components in one go. This reduces maintenance time as the exterior doesn't have to be disassembled.



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BOSCH

How Pure is Your Refrigerant?

- ▶ *Most technicians never question the purity of virgin refrigerant, and most assume the refrigerant in a vehicle is “pure enough” unless the A/C system has a mysterious cooling problem.*
- ▶ *If a technician has no way of checking the refrigerant before they pull it out of a customer’s vehicle into their recovery equipment it may contaminate their service equipment as well as other vehicles that are serviced with the contaminated equipment.*
- ▶ *The best defense against unknown refrigerant and the risks associated with unknown refrigerant is a refrigerant identifier. This has become very important with the use of hydrocarbon refrigerant blends and “pirated” refrigerants on the market today. With the new Robinair refrigerant identifiers you can isolate potentially dangerous and damaging gas.*

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Refrigerant identifiers



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Two types

- Internal – Built into an AC RRR machine
 - External – Handheld unit that can be used by itself or in conjunction with an AC RRR machine.
-
- Display concentration percentages of refrigerant it detects
 - R1234YF
 - R134A
 - R22
 - Other (Hydrocarbons)
 - Air



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AC TRAINING

Leak Detector



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LD7 (SP00101941)

- R134a and R1234yf Electronic Leak detector
- Color display with graphics and visual alerts
- Bar and Pinpoint graphing modes help locate leaks faster
- Loud audible alert with mute option
- UV and Clear LED inspection lights
- Automatic and manual calibration

LD5 (SP00101942)

- R134a and R1234yf Electronic Leak detector
- Color display with graphics and visual alerts
- Bar graph mode helps locate leaks faster
- Loud audible alert
- LED inspection lights
- Automatic and manual calibration



LD7
LD5

LD3 (SP00101943)

- R134a and R1234yf Electronic Leak detector
- Loud audible alert
- Automatic calibration



LD3



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ROBINAIR Contaminated Refrigerant



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- ▶ When an AC RRR machine runs across contaminated refrigerant
- ▶ Us a separate piece of equipment to remove the refrigerant from the vehicle's AC system
- ▶ It will need to include a low side R1234YF coupler to connect to the vehicle
- ▶ Black hose to connect to tank



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ROBINAIR Refrigerant Identifiers



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16009 - DiscovR™ Refrigerant Identifier



**16910 Cool-Tech I.D.
Plus Refrigerant Identifier**



1234-IDV



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ROBINAIR Recovery



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What is recovery?

- ▶ Recovery is the term used to remove the refrigerant from the system, once we have identified that the refrigerant is not contaminated we can use a recovery machine to remove it from the system for storage, recycling or to be disposed of if it is contaminated.



RG3000-E



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ROBINAIR RECOVERY



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MINIMAX-RA

RG5410EX



RG6000



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BOSCH

ROBINAIR

Evacuation



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What is evacuation?

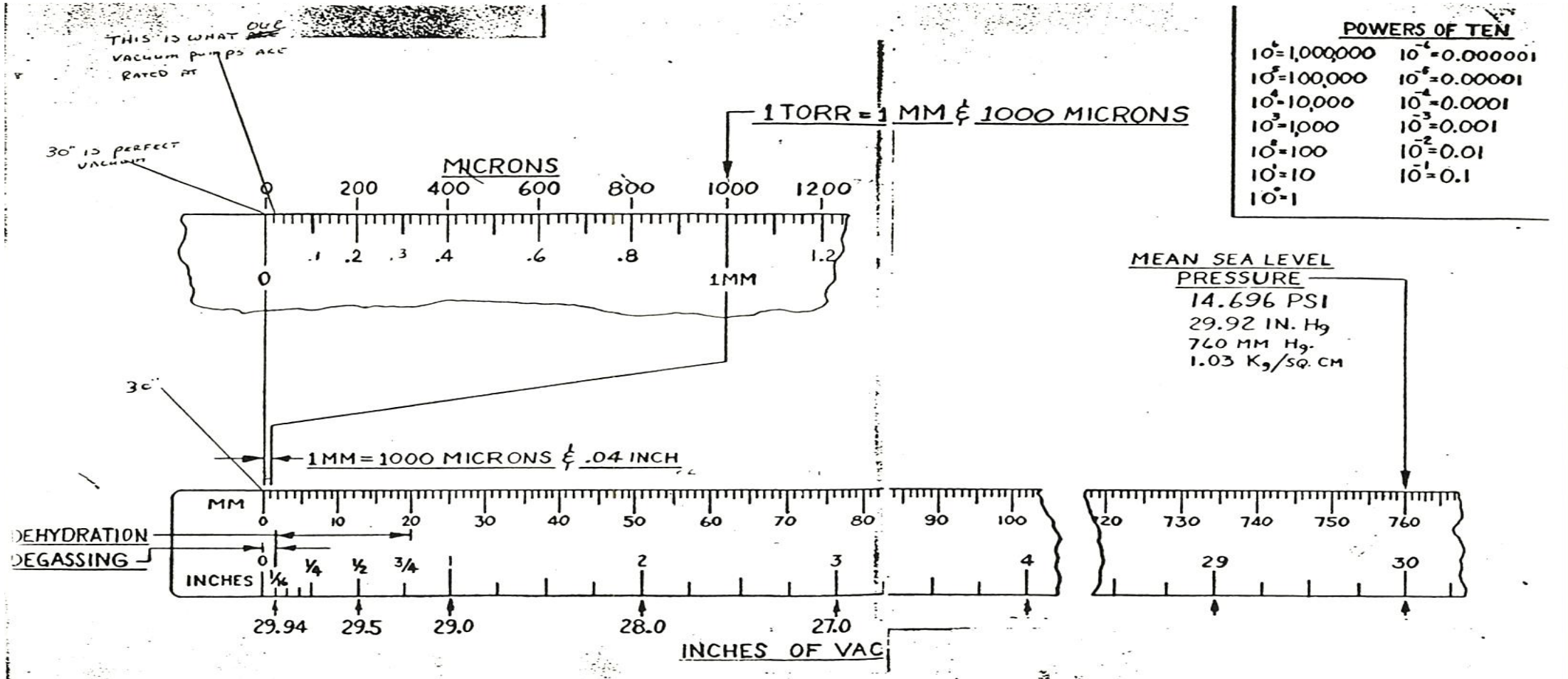
- ▶ Evacuate is the term used to remove any non-condensable, moisture, air and trapped refrigerant from the system after it has been recovered. The purpose of a vacuum pump is to remove moisture and air from an A/C system. Moisture in a refrigeration system, directly or indirectly, is the cause of most problems and complaints. “Freeze Up” is not the only problem caused by moisture. It can also result in corrosion, the effects of which are not apparent until the real damage has occurred. Also, refrigerant oil rapidly absorbs moisture. Water formed acids combine with the refrigerant, forming a closely bonded mixture of fine globules. The effect is called sludging and it greatly reduces the lubricating ability of the oil.
- ▶ A vacuum pump removes troublesome moisture by lowering the pressure within the system and vaporizing (or boiling off) the moisture, then exhausting it along with air.
- ▶ Vacuum pump rating in CFM and Microns, single and 2 stage ##



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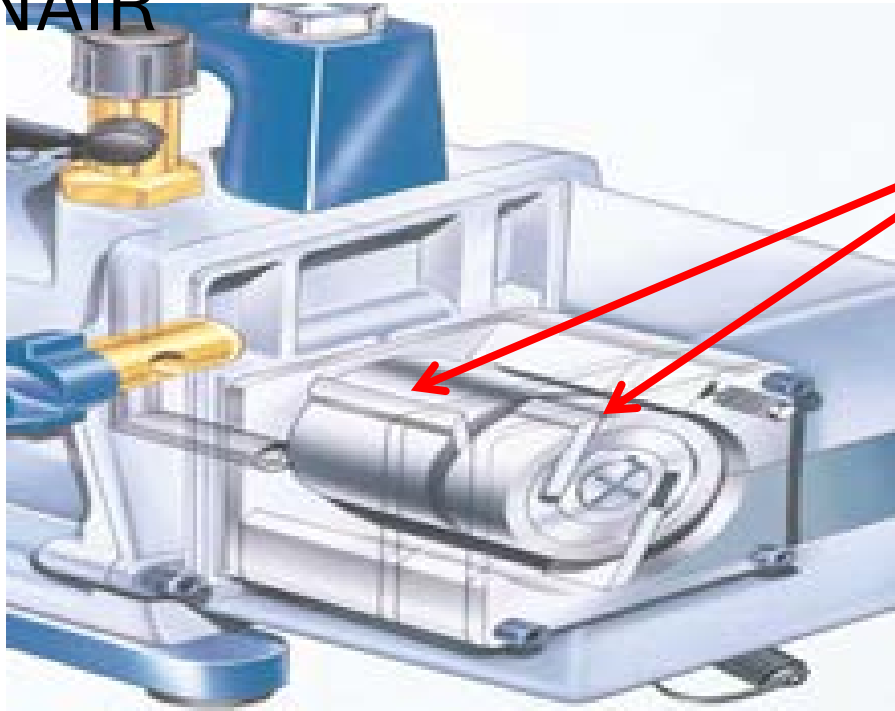




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The 2 stage pump has 2 separate pumping elements, the larger is designed to remove the large volume of air from the system while the smaller more efficient pumping element pulls on the primary stage achieving a deep vacuum.

All Robinair vacuum pumps are 2 stage and are rated to 25 micron (vacuum master) and 20 micron (cooltech range)

The vacuum master range offer a 1 year ***no fuss*** warranty,

Vacuum pump oil >

As there are no gaskets or seals within the pumping elements of the machine the oil not only lubricates but creates the seal that allows the pump to achieve a deep vacuum, it is therefore vital to make sure that the oil is changed regularly, especially if it becomes contaminated. Always use genuine robinair vacuum pump oil.



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Evacuate

Cooltech Vacuum Pumps

Available in
28 l/m, 93 l/m, 142 l/m, 236 l/m

Vacuum Master Pumps

Available in
35 l/m, 71l/m, 118 l/m, 170 l/m,
212l/m



ROBINAIR

15706 - Spark Proof Vacuum Pump



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Features:

- Spark proof pump, for use with R1234 YF / R32 (class 2L mildly flammable refrigerants)
- Two Stage Design - Cleans the system more thoroughly with a second stage vacuum, leading to a deeper ultimate vacuum level.
- Heavy Duty Motor - 1/3 H.P. motor featuring a rotary vane, sealed bearing, high torque design for easy startup and efficient operation.
- New Aluminum Reservoir Design - New cast aluminum reservoir reduces weight and creates a strong and durable pump.
- Brass Intake - Brass intake valve with 1/4" and 3/8" Flare and 1/2" Acme adapters complete with tethered caps.
- Quick Oil Changes - Oil fill port and drain plug are easily accessible for fast and complete oil changes.
- Easy View Sight Glass - Clean oil is the key to efficient pump operation; oil color and level are easy to see with the oversized sight glass.



Voltage	220Volts, 50Hz
Free Air Displacement	1181/ml
Ultimate Vacuum	25 microns
Motor	1/2 HP
Intake Port	1/4 "3/8" Flare, 1/2" ACME
Oil Capacity	300ml
Dimensions (mm)	336x138x240
Net Weight	10.5 kg



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Adding oil and dye



- ▶ When adding oil and dye to the system there are many methods used.
- ▶ If a system is open for repair this may be convenient time to add oil to the system particularly if it requires a large quantity of oil, adding dye can also be added at this stage.
- ▶ Pulling in oil / dye into the system under vacuum using an inline injector or AC charging stations use this method prior to charging the system, some care must be taken using this method as oil slugging can damage compressors, we mention this in the charging section.
- ▶ Topping up after the charge, Robinair make several oil and dye injectors that are fitted with check valves and allow you add oil and dye to a full charged system



ROBINAIR Charge



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What is charge?

- ▶ Charge is the term used to describe adding refrigerant to the system, whether it is the initial filling of a system or re-charging an existing system.



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ROBINAIR Leak testing



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16235



LD7
LD5



XL-1A



LD-020



XP-1A



ROBINAIR Diagnosis



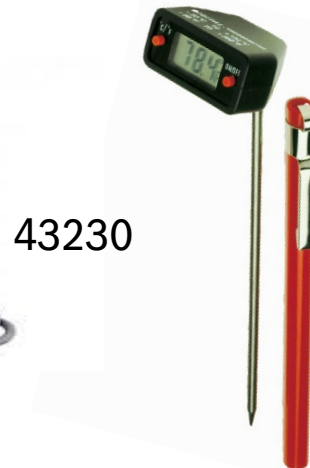
- ▶ Diagnosis of the automotive air conditioning system requires high level of understanding and experience, all too often expensive components are replaced due to bad diagnosis, I don't intend to offer you any diagnosis answers here, but we can arm you with some tools to help make the process easier.
- ▶ System diagnosis requires an understanding of the system, the changes of state and where these occur, pressure temperature relationships, and head pressures.
- ▶ We have compound manifold gauges, infrared non-contact thermometers, electronic thermistors, Anemometers, thermocouple thermometers etc.



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43240



ROBINAIR Re Cycle

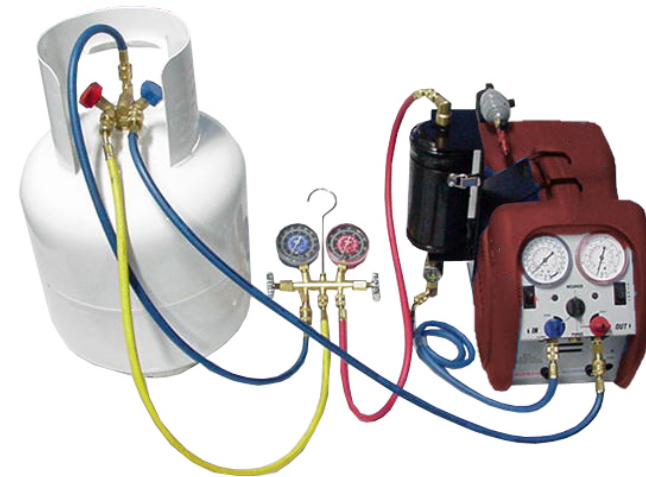


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The MINIMAX-RR is ideal for the busy workshop or mobile service vans. The Recycler is detachable enabling the technician to recover refrigerant from multiple systems and then recycle for re-use. The RG-RR (Recycle only) can also be purchased individually and used on any existing refrigerant recovery units such as: Minimax RA, RG5410, RG6000.

With the Minimax RA-RR kit will re-cycle your R134a refrigerant, by using the Mininimax, pre-filter, oil separator, filter drier, manifold and tank, the refrigerant is continuously cycled through the filters etc. until cleaned, approx. 2 hours for a 20 kg cylinder will provide >95% purity of R134a



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HVAC/R



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All jobs are different. From a rooftop to a marine HVAC system, Robinair portable recovery units recover both liquid and vapor refrigerant and withstand harsh conditions and high temperatures.

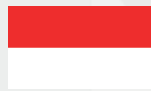


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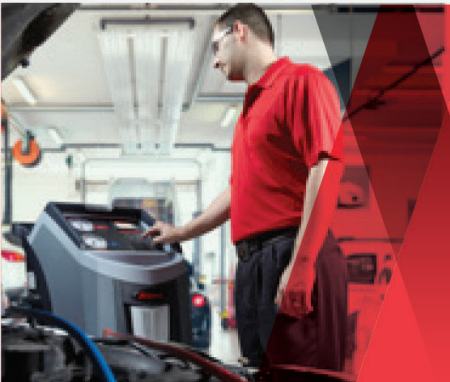
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20 KG tank
N2H2 port



Oil injection & UV
dye injection,
electronically
monitors charges
& service intervals.



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20 Kg tank
Oil injection
Connectivity



Valve-less
16 Kg tank
Eco Friendly design



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identifier, patented
monetarized ball
valves

