English

AUTO AIR CONDITIONING
PARTS & TOOLS

DISTRIBUTOR
COOL4U Kft.

Use and Maintenance Manual

Kristal

	Carefully read this use and maintenance manual before using the unit.
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CTR S.r.l. thanks you for buying a product of its range and recommends that you read this manual. It contains all the information necessary for proper use of the unit you have purchased. Please carefully read the warnings it contains and read the whole manual. Keep the manual in a safe place so that it cannot be damaged. The contents of this manual may be changed without prior notice, or any other obligations, in order to add modifications and improvements to the units already delivered. No part of this manual may be reproduced or translated without the prior written consent of the owner. CTR S.r.l. is responsible for any manufacturing defect that may arise during the entire warranty period and undertakes to correct any defect in the shortest possible time.

WARRANTY

The warranty is valid for 12 months from the date of purchase. The warranty entitles the owner to the replacement of defective parts only. The warranty is forfeited in the event that the equipment is improperly used or tampered with by persons not authorised or if non-conform components or techniques are used on it.

Declaration of conformity
Directive EEC 2006/42
Machine Directive
Directive EEC 2004/108
Low voltage directive
Directive EEC 2006/95
Electromagnetic compatibility directive
PED European Directive 97/23/EC

We, CTR S.r.l. Via T. ed E. Manzini 9, 43100 Parma (Italy) represented by its legal representative, declare on our sole responsibility that the product "Management System for air-conditioning and cooling systems" model Kristal complies with the above mentioned directives and regulations.
Furthermore the pressure circuit complies with directive 97/23 as amended, and it is classified respectively:
• Fluids Group 1, Category II for the Kristal model.
We hereby specify that the maximum permissible limits for correct operation of the unit are:
• Maximum working pressure: 20 bar
• Maximum working temperature: +50°C
• Minimum working temperature: +5°C
We also point out that:
- The year of manufacture is indicated on the label (with CE marking) applied on the unit
- The technical construction file is duly kept at the company, as laid down by the Directive
- the serial number of the unit (if present, since not obligatory) is punched on the unit.

Parma

For CTR S.R.L., the legal representative.
The label with CE marking (as shown in the figure) applied on the unit proves that it was duly inspected.
The unit bears the data explicitly laid down by the Directive; it may however be subject to changes in appearance for commercial reasons.

CTR S.r.l.
Via T. ed E. Manzini n. 9
43100 Parma Made in Italy

Model	Voltage	
Serial number	Absorption (A)	Power absorbed (W)
Max pressure	Min. temperature	Max. temperature
Refrigerant **R1234yf**	Year of manufacture	Risk category under 97/23/CE **II**

This label is only an example. The complete data label is applied on the unit.

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SYMBOLS

Below is a brief legend explaining the symbols used.

⚠	**DANGER:** draws your attention to situations or problems that may cause injury or a risk of death.
⚠	**WARNING:** draws your attention to situations or problems connected with the efficiency of the unit, which do not pose a risk to the safety of persons**.**
⊖	**PROHIBITION:** do not perform the operations indicated as they may compromise the efficiency of the unit.
!	**IMPORTANT:** draws your attention to important information of a general nature, which does not compromise personal safety or proper functioning of the unit**.**

1. Introduction

The unit described in this use and maintenance manual is a fully automatic multifunctional system with digital setting, with a database for first-installation automotive air conditioning systems and performs the following operations: gas recovery, used oil discharge, vacuum phase, leak test, new oil refilling, UV tracer recharge, gas recharge. All these operations are controlled by a microprocessor and electronic precision scales.
Listed below are the main components and their functions :

- Electronic control: controls the entire process by means of a microprocessor.
- Electronic gas weighting scale: it can weigh a maximum of 80 kg with a resolution of 1 g and interrupt the RECOVERY and CHARGE functions if programming or reaching uncontrollable quantities during the operation.
- 12 cc refrigerant gas recovery compressor.
- One anti-acid recovery filter and a new-concept dehydrator with reduced environmental impact, low cost and easy replacement procedure.
- Input gas distiller with automatic flow regulator for the separated refrigerant and oil coming from the A/C system with oil discharge.
- Oil separator positioned directly behind the compressor with automatic return during the recovery cycle.
- 10-litre cylinder for refrigerant gas recovery, equipped with an electronically controlled resistor, safety valve, safety pressure switch and electronic control of non-condensable gas discharge.
- Vacuum pump with high vacuum degree.
- Digital control panel.
- High-contrast multi-language display for environments with poor or excessive lighting.

80 mm analogue pressure gauges (Class 1.0) with pulse-free movement for A/C system diagnosis.

- Two 2.5 m highly reliable flexible hoses with quick-coupling valves and manual opening (screw fitting) for R1234yf.
- Two 250 ml embossed feeders for new oil and UV tracer.
- One 250 ml graduated tank for exhausted oil.

LIST OF FUNCTIONS

- **Recovery:** allows the unit to recover both the refrigerant and part of the oil mixed in it, automatically separating and storing them. The polluted oil is recovered in an external graduated container. The refrigerant, after regeneration through the filter, is stored in a dedicated cylinder. The system automatically quantifies by means of the scale.
- **Vacuum:** the A/C system can be brought to the maximum possible vacuum in the programmed time and kept in this condition. This way, the moisture present can be completely evacuated and the vacuum seal checked for possible leaks.
- **Recharge to vehicle:** the regenerated refrigerant can be recycled (after adding virgin oil) according to the methods provided for by the operator. You can also fill the system with new refrigerant fluid, new oil and UV tracer in the desired quantity.
- **Recharge cylinder:** this function is used to fill the internal cylinder controlled by an electronic process.
- **Automatic cycle:** performs the sequence of all the operations to restore the system with the correct levels of refrigerant and oil without the help of an operator.

⚠	Do not use the unit for purposes different from those for which it was designed. In the event of scrapping, comply with the regulations in force in the country where this operation is carried out (bear in mind that the unit contains refrigerant fluids; contact specialised companies for scrapping/demolition).
⚠	The unit must be used with the type of refrigerant indicated on the CE label. Do not use it with refrigerants different from the indicated one.

2. Technical features

Description	Unit of Measure	
Maximum power absorbed	W	900
Net weight	kg	68
Overall dimensions (HxWXD)	cm	53x60x116
Weight with full charge	kg	80
Vacuum pump flow rate	l/min	67
Final vacuum	mbar	0,1
System recovery capacity	g/min	120
Refrigerant cylinder capacity	l	9,5
Power supply voltage	V	220/240
Power supply frequency	Hz	50
Maximum current absorbed	A	4
Coupling diameter on vehicle (Low Pressure - LP)	mm	14
Coupling diameter on vehicle (High Pressure - HP)	mm	17
Maximum operating temperature	°C	50
Minimum operating temperature	°C	5
Maximum pneumatic circuit pressure	bar	20

For the connection voltage value, follow the instructions on the label on the unit.

The acoustic pressure value measured is less than 70dBA and therefore the operator does not need to take any particular protection measures even if continually using the unit (ISO 3746). Nevertheless, the employer is responsible for assessing the level of noise the workers are exposed to in accordance with the regulations in force regarding hygiene and safety in the workplace.

3. Safety warnings

It is recommended to read through this use and maintenance manual before starting to use the unit and to become knowledgeable with the controls.

In case of need, contact only our Technical Service Department (in particular for component repair and replacement).

Do not perform any repair operations. If repair operations are performed by inexperienced staff, the safety levels of the unit may be altered.

Do not place anything on the unit; the unit is neither a support surface nor a means of transport.

Never arrange the connection pipes (A/C system) and feed pipes in such a position that they may interfere or can be damaged.

For refrigerant recovery do not use containers (pressurised) unsuited to the purpose, both in terms of material and pressure level.

Always comply with the regulations in force regarding hygiene and safety in the workplace. Always follow the instructions given on the safety sheet. Never leave the unit unattended in the workplace, even if it is set to automatic mode.

3.1 Working environment

The unit should only be used by adults and responsible persons. Do not allow children to activate the control device.

Do not approach the unit with open flames or anything else that may cause overheating (with consequent risk of fire) of the refilling circuit. Do not use the unit in places where there is a risk of explosion or fire.

Do not smoke in the place where the unit operates.

Operate the unit in well lit places.

⚠ Always work in a well-ventilated environment. Operate and store the unit in a dry place protected from atmospheric agents (generally not in rough environmental conditions).

This manual contains essential safety rules for proper use of the unit: Wear safety goggles and gloves. Do not expose to rain and direct sunlight. Read the owner's manual of the vehicle to identify the type of refrigerant used before using the unit.

⚠




3.2 Preliminary checks

⚠	If the unit is turned off because of a power failure, wait about 10 seconds before restarting it, so that the electronic part can reset correctly. The electrical/electronic parts must be collected separately and disposed in accordance with applicable legislation.

3.3 Precautions

⚠ Pay particular attention to possible ejection of refrigerant, since:
- contact with the eyes may cause serious injury;
- contact with the skin (given the extremely low boiling temperature) may cause burns.

If refrigerant is ejected into your eyes or onto your skin, rinse with abundant water and immediately seek for medical assistance.

⚠ The unit has been designed for use specifically with R1234yf refrigerant. **The type of refrigerant (R1234yf) to be used is specified on the specific label.**

! After turning on the unit, wait at least five minutes before performing any operation. If the processing cycle is interrupted for any reason whatsoever (e.g. power failure) the operation must be resumed from scratch.

⚠ **The external container used for refilling must be homologated for pressures of at least 35 bar and be equipped with a safety valve (the valve must conform to the regulations for pressurised containers).**

⚠ The refrigerant storage container must NEVER be filled to over 80% its total capacity to prevent drops in efficiency. Check filling of the oil containers during operation and make sure that they are not overfilled in order to prevent sudden drops in efficiency. Do not use these containers with different types of substances.

Live parts

POWER SOCKET

EMERGENCY BUTTON

The unit is to be used by one operator only. Any other persons must keep a safety distance both during operation and during adjustment and maintenance.

Always connect the high and low pressure ducts (red and blue) with the parts provided and do not use them for purposes different from those specified.

During operation, check the level in the oil tanks to prevent them from overflowing.

Never detach the HP and LP pipes if not specifically indicated in this manual.

3.4 Maintenance

Do not use, under any circumstances, flammable liquids or detergents to clean the unit.

Always wait a few minutes after turning off to allow the system to go into reset condition (temperature and pressure).

During maintenance operations, do not waste any residues in the environment, but comply with the regulations in force.

NEVER remove the cylinder unless specifically indicated.
Do not perform any repair or maintenance operations when the unit is running or connected to the mains.
Perform exclusively the maintenance and repair operations indicated in this manual. Operations performed by unexperience persons will affect the overall safety level of the unit and expose the operator to serious risks.

3.5 Electrical power supply

The power supply of the unit must be connected according to the instructions of CTR S.r.l., the company however, is not responsible for the connection. The safety of the unit is effective only when it is properly connected to an electric energy source that has all the protections as required by the current applicable legislation (differential safety switch and earthing).

- The connection to the mains must be made using the plug provided with the unit, and a reduction used if necessary, checking beforehand that the line voltage corresponds to that indicated on the label on the rear of the unit.
- If using extensions, check that the cross-section of the cable is appropriate for its length and that it is positioned in such a way that it cannot be damaged in any way.

- In the event of damage, contact only our Technical Service Dept..

If the power plug needs to be replaced, contact our Technical Service Dept. and do not replace it unless written permission has been given by our competent department. Failure to follow this instruction, will relieve CTR S.r.l.. of any responsibility for personal injuries or property damages caused by the power supply.

If using extensions, check that the cross-section of the cable is appropriate for its length and that it is positioned in such a way that it cannot be damaged in any way (avoid walkable and wet areas).

Check that the point of connection to the electric energy source has all the protections as required by the applicable legislation (earthing and differential switch).

4. Handling and Transport

Before moving the unit, check that it is stable (check that the support surface is horizontal).
Before moving the unit, it is advisable to remove the parts installed after delivery in order to prevent damage (see the Chapter Installation).
During this phase, it is recommended to:
- Correctly position all the accessories provided to prevent them from falling or being damaged during transport
- Move slowly and carefully to prevent possible instability
- Keep an adequate distance.

Be particularly careful when handling the unit in the workplace. In particular, avoid dips, steps or similar. If you are not careful during transport, the adjustments made may not be correctly calibrated.

To transport the unit, use the wheels on the base and push the unit by hand.
Move only on flat surfaces.

To handle the unit, all the wheels must touch the ground to prevent sideways lifting.

To lift the unit, use a lift truck of adequate capacity for the weight of the unit (indicated in the technical specifications) using the pallet as support base.

4.1 Mechanical cylinder retainer

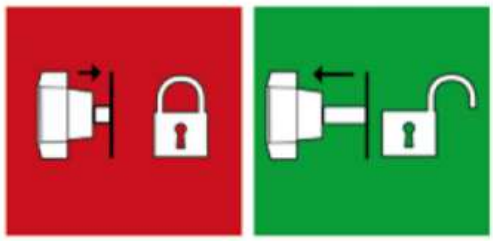
The mechanical retainer is designed to prevent involuntary movements of the refrigerant's scale.

- Press down to block the cylinder
- Pull to release the retainer. Do not rotate

This high-precision mechanical system retains the cylinder lifting its weight of the scale.
When this mechanism is in place, the electronics will prevent all operations and display the message "Remove block". Remove block and press ESC for 2 seconds. Accidental application of the retainer

during operation, will be indicated by the message “Remove block” and immediate stopping of the operation under way.

LOCKED UNLOCKED



5. General operating rules

5.1 Description

Described below are the main components of the unit:

Description

1	Low Pressure gauge (15 bar)	2	High Pressure gauge (40 bar)
3	Retro illuminated LCD Display	4	ON/OFF button
5	SD card slot	6	Keyboard
7	Refrigerant gas filter	8	Oil filling tank
9	UV tracer charge tank	10	Thermal printer
11	Gas analyzer (opt.)	12	Used oil discharge tank
13	High pressure hose	14	Low pressure hose
15	Service connections		

1 **2**

3 **4**

5 6

7 8 9 11 12 13

15 10 14

5.2 Operating phases

Described below are all the steps that the operator must follow to obtain an optimal result in absolute safety conditions, distinguishing between manual and automatic operation. To check proper functioning of the unit, there is an intelligent device which signals any faults and warns the operator by means of error messages. An acoustic warning at the end of each operation indicates that it has been completed.
Before performing the operations described below, to improve system efficiency (both in terms of energy and time) start the vehicle engine and let the cooling system run for a few minutes so that the A/C system can reach full power, i.e. normal operating conditions.

! If you have any doubts or other questions on use of the unit, please do not hesitate to contact our Technical Service Dept. or an authorised Dealer.

⚠ During the refilling operations, there will be a certain quantity of refrigerant in the connection pipes. To drain the pipes, follow the instructions given in the chapter Pipe draining procedure.

! At the end of the various phases there will be different residues in the containers. Follow the regulations in order to waste them.

⚠ The recovery, vacuum and charging operations must be carried out with the engine vehicle and the system off (without power to the compressor).

5.3 Use

We advise you to carefully read this manual for proper use of the unit.

Switching ON/OFF

- Connect the cable to the mains.
- Press the ON (“I”) button.
- To switch the machine off press the OFF (“0”) button and disconnect the electrical socket of the unit.

Keyboard features

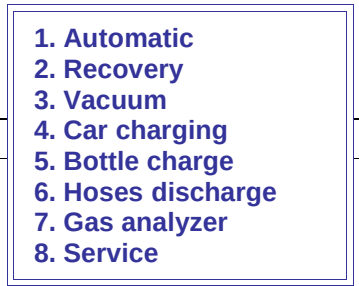
Words and names must be filled in using the alphanumeric keyboard.

Key “1”:
- Press it twice to delete the last character;

Key “0”:
- Press it twice for editing a space;
- Press it 3 times for editing a dot (“.”);
- Press it 4 times for editing “@”

Display

The display in the stand-by mode shows date, time, the CTR logo and the software version. When the SD card is updated, the software version shown automatically changes.
By pressing whatever button you can enter the main menu, listing all the functions:



The choice is made by pressing the relevant number on the keyboard.

After 30" without pressing any button the display turns back to the stand-by mode

5.4 Automatic

This function allows the system to perform the complete cycle, which consists of: recovery, oil discharge, vacuum phase, leak test, oil filling, UV tracer charge and refrigerant charge.
The automatic cycle can be performed in two ways:

1 - Automatic cycle through the database.
2 - Automatic cycle by the operator.

The automatic cycle through the database allows the unit to perform all the operations using the first-installation information contained in the SD card.
The automatic cycle by the operator allows to execute all the operations with the manual selection of the quantity of fluids to be recharged.

AUTOMATIC CYCLE EXECUTION THROUGH THE DATABASE

- Connect the high and low pressure pipes to the A/C system or, if there is just one service point, connect it to the corresponding pipe.
- Select "Automatic" by pressing the corresponding number ("1") on the keyboard.

If the quantity of gas, new oil or tracer is low the display shows "Gas insufficient", "Oil insufficient" or "Uv insufficient", but it's possible to start anyway the cycle by pressing the ENTER button.

- Select "2" for Database mode
- Select "1" for Cars Database, "2" for Trucks Database or "3" for Custom Database (see Par. 12).
- To choose the car brand press 2 to 9 buttons to select the first corresponding letters shown on the keyboard and then up "⇧ 1" and down "⇩ 0" arrows to complete the selection (Fig. 1). Press the ENTER button to confirm. To go back and modify the selection press the EXIT button.
- Select the car model and press ENTER (Fig. 2)
- Select the version (Fig. 3)
- Check the quantity of gas and the oil viscosity set for the model selected (Fig.4), then press ENTER to confirm.
- The display shows the quantity of gas to be charged in the A/C system, compared to the maximum which is possible to charge (i.e. g=500/6459). It's possible to modify the gas quantity typing the numbers on the keyboard.
- Press ENTER to confirm.
- The displays shows the oil quantity. This amount is automatically calculated by the unit as a percentage of the gas. It's possible to change it manually (Fig.5).
- Press ENTER to confirm

- The last message is relevant to the UV tracer. The amount is automatically calculated, but it's possible to change it manually as well.

1

ABARTH
ALFA_ROMEO
ASTON MARTIN
AUDI

2

MiTo
SPIDER
33
145

3

2000 JTS
1900 JTD
1900 JTD_16 V
3200 GTA

4

ALFA_ROMEO
147
1900JTD
gas=500g
ISO_46

5

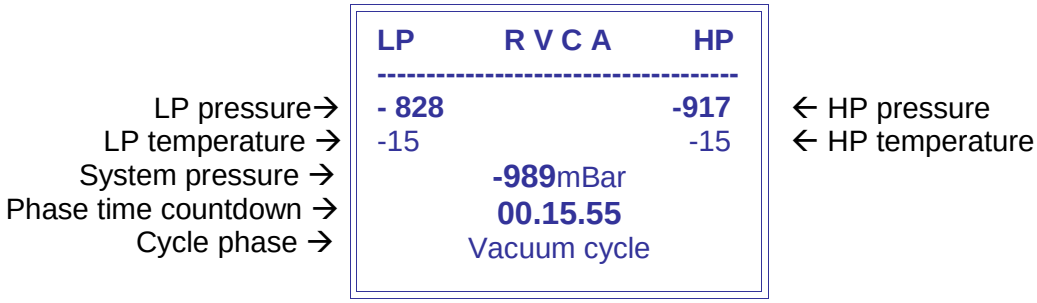
GAS: g=500/6459
OIL: g=3/70
UV: g=7/70

- It's possible to enter the Vehicle registration number. Press ENTER to proceed.
- Select "1" for connection just on the High Pressure side of the car A/C system, "2" for just Low Pressure connection or "3" for both HP and LP connections. Just for HP connection it's possible to choose if charging the refrigerant in gaseous (connection on the car A/C system before the condenser, key "1") or liquid (connection after the condenser, key "2") status.
- The cycle starts and the machine first of all checks twice the A/C system pressure ("Pressure test" shown on the display).

If there is no gas in the car A/C system the message "No gas to recover" is shown and the machine switches automatically to the vacuum procedure.

- The system performs the cycle, showing all the current phases on the display with values and text messages (Fig. 6):

6



The letters in the upper part of the display mean:

LP: gas is flowing through the LP hose
HP: gas is flowing through the HP hose
R: Recovery
V: Vacuum

C: Charging
A: Automatic

The cycle phases made by the unit are, in order: Recovery, Vacuum, Leak testing, Gas charge.

- The vacuum time in the automatic mode is calculated by the unit on the base of different parameters and can't be modified.
- The Leak testing is made to check the integrity of the car A/C system.
- The gas charging starts. If it's made just on the HP side the message "increasing bottle pressure" is shown on the display before the charge begins.
- At the end of the gas charging phase the display shows pressures and temperatures on HP and LP sides.
- If the values are correct press ENTER. If the charging was made on both HP and LP sides or just on HP side the display asks to turn on the engine, to switch on the A/C system, to disconnect the HP pipe and press ENTER.
- During the following phase all the gas still present in the pipes inside the unit is recovered in the car.
- The car engine must be turned off and the hoses can be disconnected.
- The next phase is the "Hoses recovery": the gas still present in the LP and HP hoses is recovered in the bottle.
- At the end of this phase the operation is complete and the data are resumed on the display. It's possible to print the report by pressing the ENTER button when the printer symbol is shown on the display. To avoid the printing just press EXIT.

⚠ **The waste oil container must be empty to prevent leaks.**

AUTOMATIC CYCLE BY THE OPERATOR

- Connect the high and low pressure pipes to the A/C system or, if there is just one service point, connect it to the corresponding pipe.
- Select "Automatic" by pressing the corresponding number ("1") on the keyboard.

If the quantity of gas, new oil or tracer is low the displays shows "Gas insufficient", "Oil insufficient" or "Uv insufficient", but it's possible to start anyway the cycle by pressing the ENTER button.

- Select "1" for Manual mode
- The display asks the quantity of gas to be charged in the A/C system, compared to the maximum which is possible to charge (i.e. g=/6459). Enter the gas quantity typing the numbers on the keyboard and press ENTER to confirm.
- At the same way it's possible to enter oil and UV tracer quantity.
- The next phases are as described for the automatic cycle execution through the database.

At the beginning of the charge the pressure is increased slowly by ON/OFF electrovalve steps in order to protect the car A/C system components. The same process is made when the last 50 g of gas are charged in order to get the most possible precise quantity. During these phases it's normal to hear the electrovalve opening and closing.

It's possible at any time to stop the cycle by pressing the EXIT button or to pass to the next phase by pressing ENTER.

In the event of an error, the display shows the relative message and activates an acoustic signal.

In the event of an emergency, press the OFF ("0") button to completely turn off the unit; in this case the function that was in progress will not be stored.

After charging with refrigerant, the unit checks for any air in the cylinder. If air is detected, the system activates discharge for a few seconds showing the message "Uncondensable gases discharge". The discharge pressure may vary between 5 and 20 bar.

The LEDs on the control panel indicate the cycle phase.

! *Warning: the quantity of UV tracer required for the correct contrast depends on the nature of the product. The value indicated under UV refers to contrast products sold by CTR S.r.l.*

5.5 Recovery

This function permits to recover all the refrigerant from the car A/C system and to make it reusable by means of a complete filtering and distillation process.

- Connect the high and low pressure pipes to the A/C system or, if there is just one service point, connect it to the corresponding pipe.
- Select "Recovery" by pressing the corresponding number ("2") on the keyboard.

The Recovery can be performed in two ways:

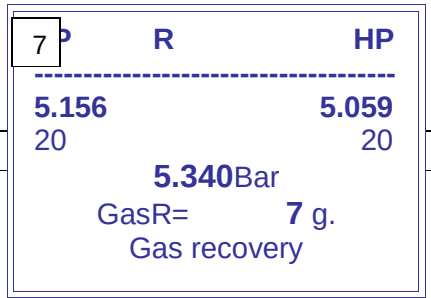
1 – Full
2 – Partial

Selecting "1" and pressing ENTER the total amount of the gas present in the A/C system is recovered in the bottle.
Selecting "2" and pressing ENTER it's possible to recover just a determined amount of gas. The display asks the quantity of gas to be recovered by the A/C system, compared to the maximum amount (i.e. g=/1482). Enter the gas quantity typing the numbers on the keyboard and press ENTER to confirm.

It's important to execute the Partial operation just on the LP side (only LP hose connected) to have a more precise amount of gas recovered.

- Select "1" for connection just on the High Pressure side of the car A/C system, "2" for just Low Pressure connection or "3" for both HP and LP connections.

- During the operation the display shows the amount of gas recovered in terms of pressure and weight (Fig. 7). The LED R (Recovery) remains lit.



The recovery phase permits to recover also the last amount of gas (about 1 bar) present in the A/C system and not to waste it in atmosphere during the vacuum operation. Moreover this operation reduces the time usually needed for the gas evaporation.
When the gas pressure arrives at -0,8 bar the waste oil discharge starts automatically. It's made thanks to compressed air and not to gas and this permits as well not to waste it in atmosphere.

- At the end of the recovery the data are resumed on the display. It's possible to print the report by pressing the ENTER button when the printer symbol is shown on the display. To avoid the printing just press EXIT.

It's possible at any time to stop the cycle by pressing the EXIT button.

In the event of an error, the display shows the relative message and activates an acoustic signal.

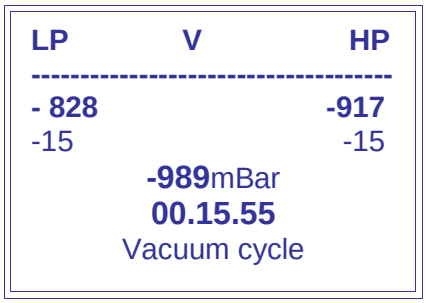
In the event of an emergency, press the OFF ("0") button to completely turn off the unit; in this case the function that was in progress will not be stored.

⚠ **The waste oil container must be empty to prevent leaks.**

5.6 Vacuum

This function allows the moisture in the system to evaporate by means of a pump that generates a high degree of vacuum.

- Connect the high and low pressure pipes to the A/C system or, if there is just one service point, connect it to the corresponding pipe.
- Select "Vacuum" by pressing the corresponding number ("3") on the keyboard.
- Enter the time desired for the phase, in minutes (30' suggested) and press ENTER
- Select "1" for connection just on the High Pressure side of the car A/C system, "2" for just Low Pressure connection or "3" for both HP and LP connections.
- Before starting the vacuum, the unit runs a check of the starting conditions with the "vacuum preparation" phase, the microprocessor briefly opens the solenoid valves, and based on the conditions acquired, independently decides how to proceed. There may be various combinations, among which activation of recovery and oil discharge, also simultaneously with the vacuum. The purpose is to protect the vacuum pump.
- During the vacuum phase the display shows pressure and time (Fig. 8). The LED V (Vacuum) remains lit during the operation.



- At the end of the vacuum phase a leak test is performed for 5 minutes in order to check the integrity of the car A/C system. If a leak is detected (-0.75 bar) an error message is shown on the display followed by an acoustic signal.
- At the end the data are resumed on the display. If a leakage lower than 0,75 bar has been detected, it's shown on the display as "dP" (Fig. 9):

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- It's possible to print the report by pressing the ENTER button when the printer symbol is shown on the display. To avoid the printing just press EXIT.

It's possible at any time to stop the cycle by pressing the EXIT button.

In the event of an error, the display shows the relative message and activates an acoustic signal.

In the event of an emergency, press the OFF ("0") button to completely turn off the unit; in this case the function that was in progress will not be stored.

5.7 Car charging

This function allows to charge the system with refrigerant, oil and UV tracer in the correct quantities.

⚠	Absolutely do not mix different types of lubricants. Always check the types of oil to be used in the different A/C systems (according to the type of compressor used), which can be found on the technical specification sheets.

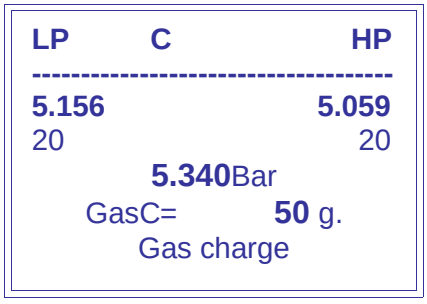
- Connect the high and low pressure pipes to the A/C system or, if there is just one service point, connect it to the corresponding pipe.
- Select "Car charging" by pressing the corresponding number ("4") on the keyboard.

If the quantity of gas, new oil or tracer is low the displays shows "Gas insufficient", "Oil insufficient" or "Uv insufficient", but it's possible to start anyway the cycle by pressing the ENTER button.

- Follow the istructions as described in Paragraph 5.4 (Manual or Database mode).

- During the charging phase the display shows pressure and weight of the gas charged (Fig. 10). “GasC:” indicates the quantity of gas remaining to be charged. The LED C (Charge) remains lit during the operation.

10



!	- Caution: to fill the system with gas, oil and UV tracer, it must be in vacuum status, otherwise an error will be signalled and the cycle locked. Press EXIT to return to the main menu.

At the beginning of the charge the pressure is increased slowly by ON/OFF electrovalve steps in order to protect the car A/C system components. The same process is made when the last 50 g of gas are charged in order to get the most possible precise quantity. During these phases it’s normal to hear the electrovalve opening and closing.

- At the end of the gas charging phase the display shows pressures and temperatures on HP and LP sides.
- If the values are correct press ENTER. If the charging was made on both HP and LP sides or just on HP side the display asks to turn on the engine, to switch on the A/C system, to disconnect the HP hose and press ENTER.
- During the following phase all the gas still present in the hoses inside the unit is recovered in the car.
- The car engine must be turned off and the LP hose can be disconnected.
- The next phase is the “Hoses recovery”: the gas still present in the LP and HP hoses is recovered in the bottle.
- At the end of this phase the operation is complete and the data are resumed on the display. It’s possible to print the report by pressing the ENTER button when the printer symbol is shown on the display. To avoid the printing just press EXIT.

It’s possible at any time to stop the cycle by pressing the EXIT button.

In the event of an error, the display shows the relative message and activates an acoustic signal.

In the event of an emergency, press the OFF (“0”) button to completely turn off the unit; in this case the function that was in progress will not be stored.

After charging with refrigerant, the unit checks for any air in the cylinder. If air is detected, the system activates discharge for a few seconds showing the message “Uncondensable gases discharge”. The discharge pressure may vary between 5 and 20 bar.

! *Warning: the quantity of UV tracer required for the correct contrast depends on the nature of the product. The value indicated under UV refers to contrast products sold by CTR S.r.l.*

REFRIGERANT TOPPING UP

If the necessity is just to top up the refrigerant in the A/C system, the only way to fill it with more gas is to perform a TOP-UP operation. To execute this phase, connect the unit to the car, start the vehicle engine and wait a few minutes until the A/C system reaches its operating power and stabilize.

- Connect the low pressure pipe.
- Start the engine and the A/C system
- Select “Car charging” by pressing the corresponding number (“4”) on the keyboard.
- Follow the istructions as described in Paragraph 5.4 (Manual mode).
- Enter the gas quantity typing the value on the keyboard and press ENTER to confirm.
- When charging has been completed stop the A/C system and the engine.

⚠ This phase must be executed with the engine on, The other phases strictly with the engine off.

5.8 Bottle charge

This function is used to fill the internal cylinder with refrigerant in order to always have a good charge range and sufficient volume to perform the recovery operations.

Use just the red high pressure pipe HP; if necessary remove the quick-coupling at its end.
Connect the pipe to an external cylinder containing exclusively R1234yf refrigerant.

If the external cylinder is not equipped with an internal plunger, it must be held upside down so that the gas can always flow out in liquid state.

- Open the cylinder.
- Select “Bottle charge” by pressing the corresponding number (“5”) on the keyboard.
- The first number shown by the display is the suggested and maximum gas quantity, in grams, that can be charged in the bottle in this operation (**60% of its total capacity**). The suggested value can be modified typing it on the keyboard. The second value is the bottle total capacity. **When the amount of refrigerant in the bottle corresponds to the maximum capacity it’s not possible to recover gas (just charging operations admitted).**
- Press ENTER to continue with this function. During this operation, the display shows the general parameters, and “GasR:” indicates the gas recovered. The unit adapts its recovery capacity in relation to the pressure coming from the external cylinder.

If the quantity of gas recovered in the external cylinder is lower than the amount selected the display shows the message “Pressure less than min” and the operation stops. Press EXIT to return to the main menu.

- When the operation is complete the display shows the message “Close external bottle and press ENTER”.
- The following phase is the “Ending of recovery”: the HP hose is discharged.

- At the end of the operation the display shows time and quantity of gas recovered.
- Press ENTER to return to the main menu.
- Disconnect the hose.

The bottle charge can last about 40 minutes

It's possible at any time to stop the cycle by pressing the EXIT button.

In the event of an error, the display shows the relative message and activates an acoustic signal.

In the event of an emergency, press the OFF ("0") button to completely turn off the unit; in this case the function that was in progress will not be stored.

During this cycle, the filter counter does not increment.

5.9 Hoses discharge

This function can be used if it's necessary to check the pressures on HP and LP sides of the car A/C system without doing any other operation. Before disconnecting the pipes it's necessary to discharge them.

- Select "Hoses discharge" by pressing the corresponding number ("6") on the keyboard.
- It's possible to select:

1. LP connection
2. HP-LP connection

1. With the car engine turned off, after having pressed "1" on the keyboard the display asks to disconnect the LP hose and press ENTER. The display shows the message "Hoses recovery" and at the end of the operation returns to the main menu.

If there's no gas left in the hose the display shows the message "Pressure less than min" and the operation stops. Press EXIT to return to the main menu.

2. After having pressed "2" on the keyboard the display asks to switch on the vehicle and the A/C system, to disconnect the HP hose and press ENTER. During the following phase all the gas still present in the hoses inside the unit is recovered in the car. The car engine must be turned off and the LP hose can be disconnected. The next phase is the "Hoses recovery": the gas still present in the LP and HP hoses is recovered in the bottle and at the end of the operation the display returns to the main menu.

It's possible at any time to stop the cycle by pressing the EXIT button.

In the event of an error, the display shows the relative message and activates an acoustic signal.

In the event of an emergency, press the OFF ("0") button to completely turn off the unit; in this case the function that was in progress will not be stored.

During this cycle, the filter counter does not increment.

5.10 Gas analyzer (Optional)

The HFO-1234yf Refrigerant analyzer is designed to analyze the purity of R1234yf refrigerant in an external cylinder or in a car A/C system. The device is integrated in the unit (optional). The analyzer measures R1234yf, R134a, Hydrocarbons and the presence of other contaminants with great precision.

Analyze the gas before each recovery and make a hoses flushing operation (see Par. 6.8) before the analysis.

- Select "Gas analyzer" by pressing the corresponding number ("7") on the keyboard. If the instrument is not present in the unit the display shows the message "Analyzer not ready".

- The display asks to connect the LP hose to the car A/C system or the external cylinder (the gas sample must be vapor-only refrigerant). Press ENTER.

- If the purity of the R1234yf is greater than the purity limit the result shown on the display will be "OK". Otherwise the message is "R1234yf contaminated".

- At the end the LP hose can be disconnected.

The analysis is repeated 3 times in order to reduce "false alarms".

! *Warning: If the gas is contaminated don't make any recovery*

The analyzer white filter located on the unit itself must be replaced when the colour changes (ol contamination). The replacement does not require any tools.
We recommend to replace the white filter at the same time as the AC service station filter is replaced. The filter must be replaced in any case when it becomes yellow (oil contamination) or when the display shows the relevant message.

Error codes and solutions

If an error is encountered during the process one of the following error message is shown on the display:

"00001": Air or gas readings unstable.
- Solution: Move the unit away from sources as radio transmitters and arc welders.

"00002": Air or gas readings excessively high.
- Solution: Move the unit away from sources as radio transmitters and arc welders.

"00003": Air calibration resulted in a low output.
- Solution: Prevent refrigerant from flowing into the unit through the sample inlet during air calibration.
- Solution: Allow any refrigerant in the atmosphere to dissipate before performing air calibration

"00004": The unit is beyond the operating temperature range

- Solution: Move the unit to an area where the ambient temperature is within the specified operating range.

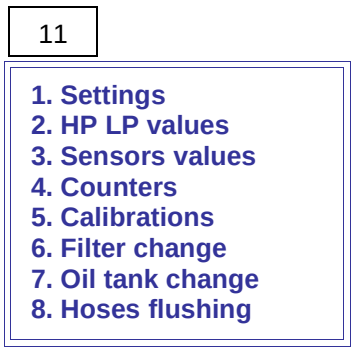
"00005": The refrigerant sampled has an excessively large amount of air or there was little or no sample flow due to a closed valve or plugged sample filter. This is the code to prompt the user to change the brass filter. This should be considered more as a prompt than an actual error.

- Solution: Verify the coupler valve is open.
- Solution: Verify the sample filter is not plugged with debris or oil
- Solution: Replace brass sample filter

6 Service Menu

! The basic settings allow the unit to start operating immediately in all the phases.

This menu contains all the functions necessary for optimal use, customisation and maintenance of the unit. By pressing number "8" on the keyboard, the display shows the Service menu (Fig. 11):



The choice is made by pressing the relevant number on the keyboard.

6.1 Settings

Set date/time

This option permits to set, in order: Year (4 digits), Month, Day, Hour and Minutes. Type each value and press ENTER. At the end the display return to the Settings menu.

Select language

This option allows you to select one of the available languages. Enter the corresponding number shown on the display and press ENTER. The display return to the Settings menu.

Customizing

This function allows to set the presence ("V") or absence ("X") of the gas analyzer (optional). Press "1" to change the status. At the end the display returns to the Settings menu.

Workshop data
This option allows to view or typing new workshop data such as address, phone number etc., which will be printed together with the operations resume for the customer.

LAN configuration
This function allows to enter or change the data for the configuration of the LAN, in order to connect the unit to a PC via an access point and to control its parameters in remote using an internet browser.

There can be also the possibility of having a connection between the unit and the CTR technical assistance center.

The data to be entered are, in order:

- IP address
- Subnet mask
- Gateway

These data depends on the customer network. For further information please contact the network administrator.

To connect the unit via a Wi-Fi network follows the instruction given with the access point for the configuration.

Import/Export
This function permits to import and export calibration and counters data between the microprocessor and the SD card. It's an option useful when these data are accidentally deleted in the microprocessor, if the microprocessor must be replaced or if the operator wants to print these data.

- **Printing data** – Select the export function to copy the data in the SD card, extract the SD and move it to a pc slot to print.
- **Restoring data** – Select the export function before replacing the microprocessor in case of failure. After the replacement re-import the data on the new processor from the SD card.

The unit asks to confirm the operations before proceeding.

! If the containers must be replaced don't use this function to import the calibration data, but follow the calibration procedure (Par. 6.5).

Printer test
The printer correct working is tested by selecting this function.

6.2 HP LP values
This function allows to check pressure and temperature values on HP and LP sides when the hoses are connected to a car A/C system. Press EXIT to return to the Service menu.

6.3 Sensors values
By accessing this option all the current values of the unit sensors are displayed as follows:

- LP: pressure on the LP side [bar];
- HP: pressure on the HP side [bar];
- P: pressure after HP and LP valves [bar];
- T: cylinder temperature [°C];
- GAS: quantity of gas in the cylinder [kg];
- OIL: quantity of new oil [g];
- UV: quantity of UV tracer [g];
- EOIL: quantity of exhausted oil [g].

Press ENTER to display the values parameters. Press EXIT to return to the Service menu.

6.4 Counters

With this function it's possible to check the counters of gas, oil, pump, compressor and filter.

Gas counters

The display shows the following counters:

- GasRV tot. Total quantity of refrigerant recovered from a vehicle [kg].
- GasRV rel. Relative quantity of refrigerant recovered from a vehicle [kg].
- GasC tot. Total quantity of refrigerant charged [kg].
- GasC rel. Relative quantity of refrigerant charged [kg].
- GasRB tot. Total quantity of refrigerant recovered from an external cylinder [kg].
- GasRB rel. Relative quantity of refrigerant recovered from an external cylinder [kg].
- GasRT tot. Total quantity of refrigerant recovered (GasRV tot. + GasRB tot.) [kg].
- GasRT rel. Relative quantity of refrigerant recovered (GasRV rel. + GasRB rel.) [kg].

The total counters follow the life of the unit and cannot be reset. The relative counters can be reset by the operator as follows.

Press ENTER or EXIT to confirm. It's possible to print the data by pressing the ENTER button when the printer symbol is shown on the display. To avoid the printing just press EXIT.

The display shows the message "Erase Rel. counters?". Press ENTER to confirm or EXIT.

Oil counters

The display shows the following counters:

- OilC Total quantity of oil charged [kg].
- UvC Total quantity of UV tracer charged [kg].
- OilR Total quantity of exhausted oil recovered [kg]

These counters follow the life of the unit and cannot be reset.

Press ENTER or EXIT to return to the Counters menu.

Pump counters

This option shows the vacuum pump working hours:

- Pump h. Total counter. It follows the life of the pump and cannot be reset [hours].
- Pump hp Partial counter. It follows the oil changes and can be reset manually just when the vacuum pump oil is replaced (Par. 8).

Press ENTER or EXIT to return to the Counters menu.

Compressor counters

This option shows the compressor working hours:

- Compr h. Total counter. It follows the life of the compressor and cannot be reset [hours].
- Compr hp Partial counter. It can be reset manually if the compressor needs to be replaced

Press ENTER or EXIT to return to the Counters menu.

Filter counter

The display shows the number of filters changed, the use percentage of the filter in the unit and the date of the last replace. These counters automatically reset when changing the filter (see Par. 6.6).

Press ENTER or EXIT to return to the Counters menu.

6.5 Calibrations

⚠ This section of the menu is only for technical service staff authorised by CTR S.r.l.

Gas cell

This option allows to calibrate the gas scale.

Before proceeding carefully read the following:

⚠ Before starting the calibration procedure, completely empty out the cylinder of the unit using a second recovery unit, in order not to pollute the environment with refrigerant (see procedure here below)

⚠ ***If you do not have a second recovery unit, do not continue with the operation!***

- The phases of this cycle are divided into: discharging the refrigerant from the cylinder, vacuum in the cylinder and calibration.
- Connect the second recovery unit to the HP connection and start a recovery phase on the second unit to discharge the refrigerant from the cylinder. Start a vacuum phase on the second unit in order to completely empty the cylinder.

- When the operation is complete disconnect the second unit.

After having selected the “Gas cell” calibration it’s possible to choose between “Hard calibration” (2 points) or “Soft calibration” (1 point). For the hard calibration a sample weight is needed (2 kg min., 5 kg suggested).

Hard calibration

The display asks to set the sample weight, in grams. Place the sample weight on the cylinder. After having entered the value press ENTER. The unit weighs sample and cylinder. A new message asks to remove the sample weight from the cylinder and press ENTER. Remove the weight, wait a few seconds and press ENTER to confirm.
The progress bar scrolling indicates that the procedure is being run properly. If the cycle has not been performed successfully, it must be repeated.

Soft calibration

The calibration is made considering and setting just the cylinder weight (tare). Select this option just if, testing the gain given by a known weight sample added to the cylinder, the difference monitored in the “Sensor values” display (see Par. 6.3) is not correct.

Oil cell

This option allows to calibrate the oil scale. A 300 to 800 g sample weight is necessary.

After having selected the “Oil cell” calibration it’s possible to choose between “Hard calibration” (2 points) or “Soft calibration” (1 point).

Hard calibration

The display asks to set the sample weight, in grams. Position the sample weight so that it is in contact only with the container (which must remain mounted). After having entered the relevant value press ENTER. The progress bar indicates that the procedure has been completed.
A new message asks to remove the sample and press ENTER. Lift the weight, wait a few seconds and press ENTER. The progress bar scrolling indicates that the procedure is being run properly. If the cycle has not been performed successfully, it must be repeated. If the cycle has been performed successfully, the display returns automatically to the Calibration menu.

Soft calibration

The calibration is made considering and setting just the bottle weight (tare). Select this option just if, testing the gain given by a known weight sample added to the bottler, the difference monitored in the “Sensor values” display (see Par. 6.3) is not correct.

UV cell

This option allows to calibrate the UV scale. A 300 to 800 g sample weight is necessary.

After having selected the “UV cell” calibration it’s possible to choose between “Hard calibration” (2 points) or “Soft calibration” (1 point).

Follow the same instructions given for the oil cell calibration.

Exhausted oil

This option allows to calibrate the exhausted oil scale. A 300 to 800 g sample weight is necessary.

After having selected the “Exhausted oil” calibration it’s possible to choose between “Hard calibration” (2 points) or “Soft calibration” (1 point).

Follow the same instructions given for the oil cell calibration.

P sensor HP

This option allows to calibrate the HP pressure sensor.

After having selected the “P sensor HP” calibration it’s possible to choose between “Hard calibration” (2 points) or “Soft calibration” (1 point).

Hard calibration
The display shows the message “Remove quick couplers and press ENTER”. Remove HP and LP quick couplers and press ENTER to confirm. When the progress bar is complete the display asks to close the quick couplers and press ENTER. Fix HP and LP pipes again and press ENTER to confirm. At the end of the calibration the display returns automatically to the Calibration menu.

Soft calibration
The calibration is made just considering the atmospheric pressure. The display shows the message “Remove quick couplers and press ENTER”. Remove HP and LP quick couplers and press ENTER to confirm. When the progress bar is complete the display returns automatically to the Calibration menu. Fix HP and LP pipes again.

P sensor LP

This option allows to calibrate the LP pressure sensor.

After having selected the “P sensor LP” calibration it’s possible to choose between “Hard calibration” (2 points) or “Soft calibration” (1 point).

Follow the same instructions given for the “P sensor HP” calibration.

P general

This option allows to calibrate the general pressure sensor.

After having selected the “P general” calibration it’s possible to choose between “Hard calibration” (2 points) or “Soft calibration” (1 point).

Follow the same instructions given for the “P sensor HP” calibration.

Temperature

This option allows to calibrate the temperature sensor.

After having selected the “Temperature” calibration the display asks to set the cylinder temperature, which must be measured in a point right in contact with the cylinder. Enter the value and press ENTER to confirm. At the end of the operation the display returns automatically to the Calibration menu.

6.6 Filter change

This unit is equipped with an electronic system that automatically performs all the phases required for the filter replacement, ensuring full safety for the operator without the help of technical staff.
When the filter counter arrives at 95% of the value of recovered refrigerant set, a message prompting the operator to replace the filter is displayed for a few seconds after the unit activation, followed by the percentage between brackets. Order the new filter at the CTR sales network.
When the value arrives at 100% just the message “Replace filter” is displayed.

- Always replace the filter each time the “Replace filter” message is displayed.
- **If the operator ignore the message the unit locks until the filter replacement is executed.**
- Use only dedicated original spare parts. The filters purchased by CTR have a key code which must be entered on the unit before the replacement. If the code is incorrect the unit does not allow the replacement. There are no compatible filters on the market.

- After having selected the “Filter change” function in the Service Menu the system may activate a procedure to release the pressure from the filter.
- When the procedure has been completed the display asks to enter the spare part filter code (Serial Number, “S/N=”). This number is printed on the label stuck on the filter:

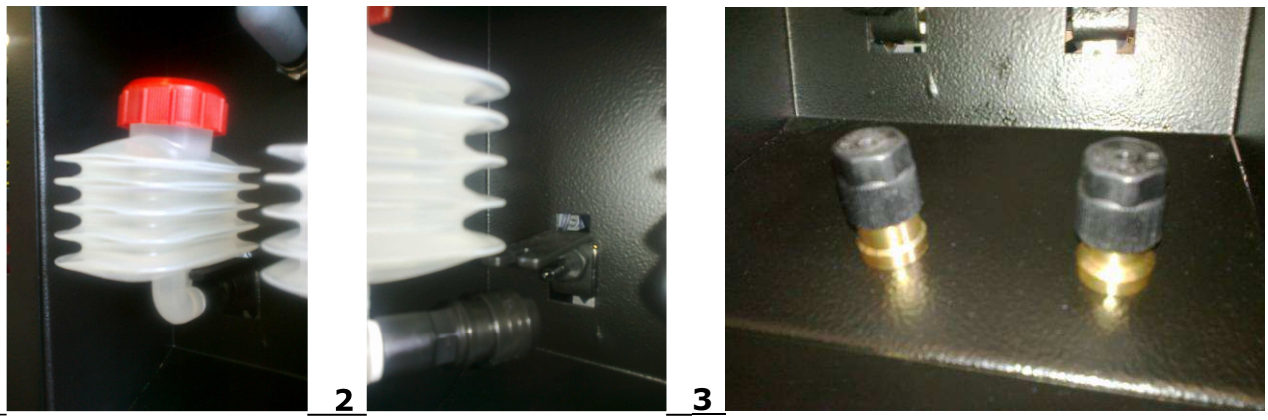
SERIAL NUMBER
0239797XXX

- Enter the key code and press ENTER.
- If the code is not correct the display shows the message “Wrong serial number!”, but it’s possible to try again up to 3 times. After 3 wrong serial numbers typed the operation is aborted.
- If the key code is correct, the message “Replace filter and press ENTER” will be shown on the display. Do not turn off the unit.

- Remove the filter cover from the unit side.
- Unscrew the screws and remove the filter.
- Remove the film from the top of the new filter.
- Check the conditions of the O-rings and replace them if necessary.
- Fit the new cartridge keeping the hole on the external side and fix it with the screws
- Apply the cover again
- Press ENTER

The unit automatically performs the dehumidification procedure, a leak test, gas recycling in the cylinder, and finally resets the partial counter and the service message. If there are any problems, an error message is displayed and the operation stopped.
The time required for the entire operation is about 30 minutes.

6.7 Oil tank change



1 **2** **3**

When the display shows the message “Oil insufficient” or a different type of oil must be used it’s necessary to replace the oil tank (Fig. 1) as follows.

The shape of the tank is studied in order to permit the volume reduction during the suction of fluids, just to avoid air filling and oil polluting by humidity in the containers (Fig. 1).
Always screw the cap tight after oil refilling in order to avoid air suction.

Use just fluids and containers purchased by CTR S.r.l.

Even If the oil to be used is the same and just a top up is needed, always disconnect the tank by pulling the plastic quick coupler (Fig. 2) and refill it removing the cap.

Don't remove the cap without disconnecting the tank.

If it's necessary to use different oils, it's important to use different containers, one for each type of oil.

⚠	Absolutely do not mix different types of lubricants. Always check the types of oil to be used in the different A/C systems (according to the type of compressor used), which can be found on the technical specification sheets.

When changing the oil type the system washes internal and external hoses of the unit in order to avoid contaminations between different lubricants.

- Select "Oil tank change" in the Service Menu.
- The displays asks to connect the quick couplers, replace the oil tank and press ENTER.
- Connect the hoses quick couplers to the HP and LP sockets on the side of the unit, close to the oil tank (Fig. 3).

⚠	Absolutely do not proceed with the operation without connecting the quick couplers to the sockets before.

- Replace the oil tank and press ENTER.

The unit does not permit to proceed with the operation until the oil tank is replaced. An acoustic signal is performed by the unit in this event.

- The system washes the unit internal and external hoses using the refrigerant gas. Gas charging and discharging is repeated 4 times through both HP and LP hoses.
- At the end of the operation disconnect the hoses.

6.8 Hoses flushing

This function permits to flush the HP and LP hoses.

This operation must be repeated periodically and in particular before a gas analysis (see Par. 5.10), in order not to have contaminations between the gas filled in the car A/C system and the one left in the unit hoses.

- Select "Hoses flushing" in the Service Menu.
- The displays asks to connect the quick couplers and press ENTER.
- Connect the hoses quick couplers to the HP and LP sockets on the side of the unit, close to the oil tank (Fig. 3).

⚠	Absolutely do not proceed with the operation without connecting the quick couplers to the sockets before.

- Press ENTER

The unit does not permit to proceed with the operation if the hoses are not connected to the sockets. An acoustic signal is performed by the unit in this event.

- The system washes the hoses using the refrigerant gas. Gas charging and discharging is repeated 4 times through both HP and LP hoses.
- At the end of the operation disconnect the hoses.

6.9 UV tank change

When the display shows the message “Uv insufficient” it’s necessary to replace the UV tank (Figure).

The shape of the tank is studied in order to permit the volume reduction during the suction of the tracer, just to avoid air filling and fluid polluting by humidity in the containers.
Always screw the cap tight after oil refilling in order to avoid air suction.

Always disconnect the UV tracer tank by pulling the plastic quick coupler and refill it removing the cap.
Don’t remove the cap without disconnecting the tank.

7. SD card database update

The vehicle database resides on the removable SD card housed on the circuit board of the unit.

⚠	This operation may only be carried out by technical service staff authorised by CTR S.r.l.. Contact your local Dealer.

If the SD card is removed the display shows the message “SD card not present”.

On the SD card are stored the folders relevant to all the operations made by the unit (Automatic, Charging, Recovery and Vacuum) in HTML format and the vehicle databases, in the “sys” folder (cars, trucks and custom).

The custom database can be modified by the operator via pc, deleting or adding data in the “custom.H” file. The limit of 21 characters must be respected, as the spaces, when editing.

8. FTP (File Transfer Protocol)

Through FTP it’s possible to check the SD card data in remote and without removing it from the unit. Using an access point (opt.) to connect the unit to a pc (see “LAN Configuration” in Par. 6.1) it’s possible to see the data in an internet browser, using the same address as before but entering “FTP” instead of “IP”.

To connect the unit via a Wi-Fi network follows the instruction given with the access point for the configuration.

For further informations please contact the network administrator.

9. Refrigerant transfer from the unit to an external container

To drain the cylinder, perform the following operations:

- Turn on the unit, connect the HP pipe to a cylinder or another external container prepared to collect the refrigerant and open the valves on the connection line.
- Follow the “Car charging” procedure described in the Par. 5.7, setting the quantity of gas to be transferred and the oil quantity to zero.
- When the transfer phase has been completed, close the valves and recover the residual pressure in the pipe.

10. Thermal printer

To change the paper roll proceed as follows:

1- Open the printer cover
2- Set the paper roll in the compartment respecting the rotating direction.
3- Pull the paper until it comes out of the compartment and close the cover.
4- The printer is now ready for printing.

11. Vacuum pump oil replacement

The life of the vacuum pump is monitored by the electronic system in order to always ensure optimal efficiency and a long life in normal operating conditions. When the service message “Replace vac pump oil” is displayed proceed as follows:

⚠ When topping up or changing the oil in the vacuum pump, use specific oil for vacuum pumps.

To top up (see figure)
unscrew the cap (1) and pour in oil until it reaches mid-level of the sightglass; when done, screw the cap back on.

1

To change the oil
- Run the pump for 10 minutes
- Disconnect the unit from the power supply
- Remove the drain plug positioned in the lower part of the pump; wait until all the oil has drained out; refit the drain plug
- Unscrew the cap (1) and pour in new oil until it reaches mid-level of the sightglass. Screw the cap back on.

When the message “Replace vac pump oil” is displayed, EXIT and ENTER will appear under the item “Vacuum pump hours” in the SERVICE menu. After changing the oil, press ENTER to reset the partial counter.

12. Service pipes

The unit is provided with 2.5 m long pipes for connection to the A/C system.
If these pipes are not long enough for operating or functional requirements, 3-6 m long pipes are available at our sales point.

13. Spare parts

All the spare parts are sold by CTR network.

14. Adhesive labels

Explained below is the meaning of the adhesive labels used:

15.

OIL ↑	Indicates the container for fresh oil charge.
OIL ↓	Indicates the container for old oil discharge.
UV ↑	Indicates the container for UV tracer charge.
	Indicates that there are high-voltage parts with the risk of electrocution
	Wear safety goggles. Contact with the eyes may cause serious injury.
	Operate and store the unit in a dry place protected against atmospheric agents.
	Read the owner's manual of the vehicle to identify the type of refrigerant used before using the unit.
	Wear protective gloves. contact with the skin (given the extremely low boiling temperature) may cause burns.

Troubleshooting

To perform repair, maintenance or adjustment operations not described in the above chapters, contact skilled staff only. Failure to follow this instruction will relieve CTR of any responsibility for unit malfunctioning.

The table indicates the persons that need to perform the operation. Strictly follow the instructions given.

After solving the problem following the instructions, the phases you were executing can be repeated from scratch.

Problem	Causes	Remedies	Operation
The machine does not work	1) Repeated turning on and off 2) External unit fuses blown 3) Internal unit fuses blown	1) Turn off the machine and wait at least 10 sec. before restarting it 2) Replace with Type T fuses (see figure below) 3) Replace	1) Operator 2) Operator 3) Technical staff
The unit does not recover	1) Fuse blown 2) Recovery compressor damaged	1) Check the integrity of the recovery compressor/solenoid valve fuse on the circuit board 2) Replace the compressor	1) Technical staff 2) Technical staff
The vacuum pump does not work	1) Gas in the circuit 2) No power to the pump 3) Vacuum pump damaged	1) Execute a recovery phase 2) Check the electric power supply and the fuses 3) Replace the pump	1) Operator 2) Technical staff 3) Technical staff
The vacuum timer does not start but the pump works and the pressure gauges indicate -1 bar	1) Pressure sensor out of calibration 2) The pump is not running	1) Calibrate the pressure sensor (see Service menu). 2) Check the integrity of the vacuum pump fuse on the circuit board.	1) Operator 2) Technical staff
A leak is always indicated after the leak test	1) Pressure sensor out of calibration 2) Sediment in the vacuum solenoid valve	1) Calibrate the pressure sensor (see Service menu). 2) Remove the sediment	1) Operator 2) Technical staff
The unit does not charge the refrigerant	1) The charge solenoid valve does not open	1) Check the integrity of the solenoid valve fuse	1) Technical staff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