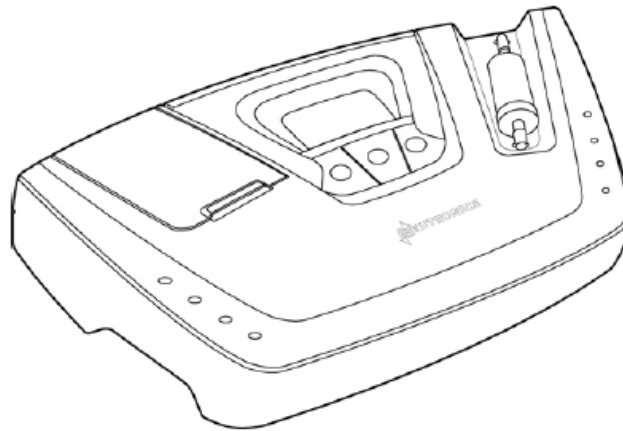


Seminar for Refrigerant Identifier- User

Model : Neutronics Ultima ID-HVAC

By : COOLTECH SOLUTION SDN BHD



Present By : David Lim Siow Wei



Group Of Company

COOLTECH

PROVIDE 1 STOP SOLUTION

COOLTECH

ROBINAIR

 **Neutronics**
Refrigerant Analysis **OTC**

 **macnaught** **60 YEARS**
OF INNOVATION



 **STAHLWILLE**

DYNOTECH

WAECO
by Dometic GROUP

HOFMANN

CARTEC 

AUTOTECH

 **DENSO**

GREENTECH

 **BrainBee**
AUTOMOTIVE

 **WIGAM**



Certificate No. : MYQ11184425

This certificate has been

Awarded to

COOLTECH SOLUTION SDN BHD

Which is located at

**NO. 20, JALAN U1/32, HICOM GLENMARIE INDUSTRIAL PARK, 40150 SHAH ALAM,
SELANGOR, MALAYSIA.**

On Standard

ISO 9001 : 2015

Which the organization stated above had been assessed and found to be in accordance with the requirements of international Quality Management System.

Under the Scope of

SUPPLY AND SERVICES OF AUTOMOTIVE WORKSHOP EQUIPMENT – HOIST, ALIGNMENT MACHINE, BALANCER, TOOLS, AIR CONDITIONER MACHINE AND SPARE PARTS.

Original Issued Date : **7th November 2018**

Effective Date : **7th November 2018**

Expiration Date : **6th November 2021**

This certificate will be null and void if at any circumstances the compliance towards the standards of ISO 17021 is not fulfilled. The compliance of the standards stated above will be indicated by the labelling on the right corner indicating the year of assessment. The validity of the certificate can also be traced to the audit report generated for each every assessment or through our website www.carecert.net



QS 02032013 CB 13

Fleming Teo
Managing Director
CARE Certification International (M) Sdn. Bhd.



Certificate No. : MYE11184427

This certificate has been

Awarded to

COOLTECH SOLUTION SDN BHD

Which is located at

**NO. 20, JALAN U1/32, HICOM GLENMARIE INDUSTRIAL PARK, 40150 SHAH ALAM,
SELANGOR, MALAYSIA.**

On Standard

ISO 14001: 2015

Which the organization stated above had been assessed and found to be in accordance with the requirements of international Environmental Management System.

Under the Scope of

SUPPLY AND SERVICE OF AUTOMOTIVE WORKSHOP EQUIPMENT – HOIST, ALIGNMENT MACHINE, BALANCER, TOOLS, AIR CONDITIONER MACHINE AND SPARE PARTS.

Original Issued Date : **7th November 2018**

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EMS 23082013 CB 09

Fleming Teo
Managing Director
CARE Certification International (M) Sdn. Bhd.

COOLTECH Networking MAP

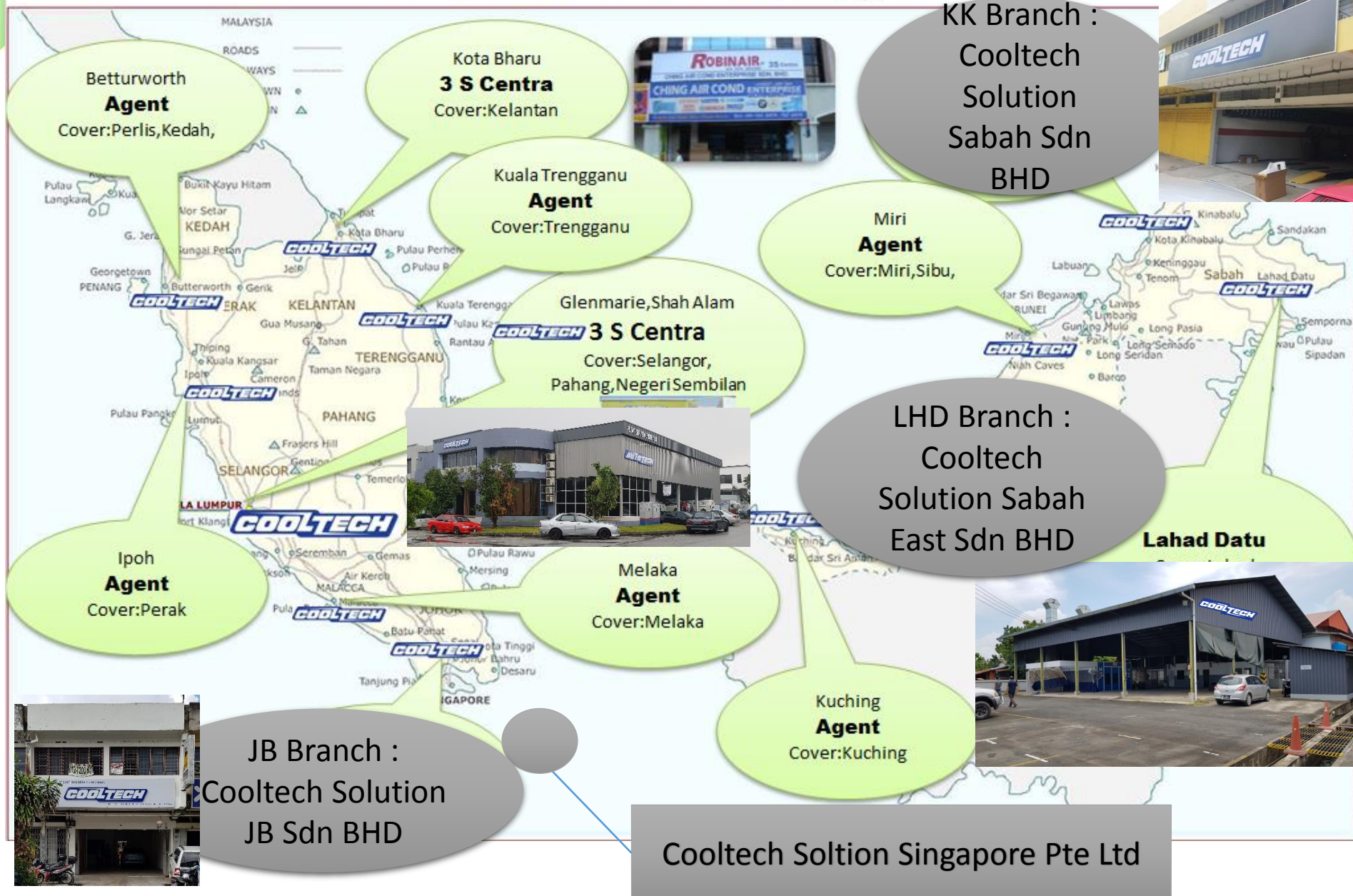


Table of Contents

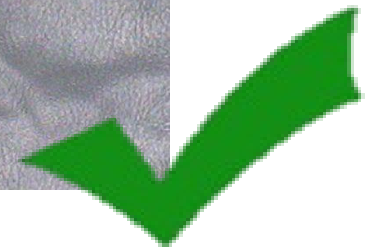


- Cautions and Warnings
- Functional Description
- Basic knowledge of refrigerant - air conditioning system
- Hardware Description
- Standard Operation Procedure
- Demonstration
- Q & A

Cautions and Warnings



- **ALWAYS** use eye protector when working with compressed gases. We recommend wearing gloves when working with refrigerants.



Cautions and Warnings



- DO NOT direct refrigerant vapors venting from hoses towards the skin.



***Will
cause***

Frostbite



Tank Safety

COOLTECH

Explode

IF

**Liquid more than
80%.**

**Temperature exceed
57 Celsius**

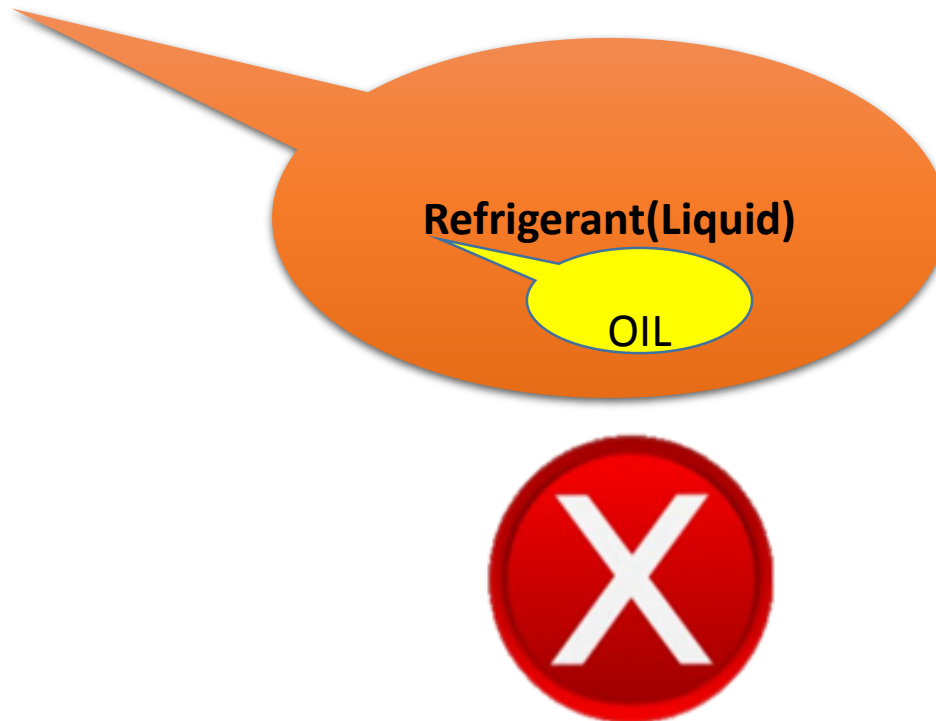
**Exceed the working pressure
of each cylinder.**



Cautions and Warnings



- ALWAYS verify that the refrigerant to be tested does not contain or will not emit heavy loads of **oil** or **liquid**.



Cautions and Warnings



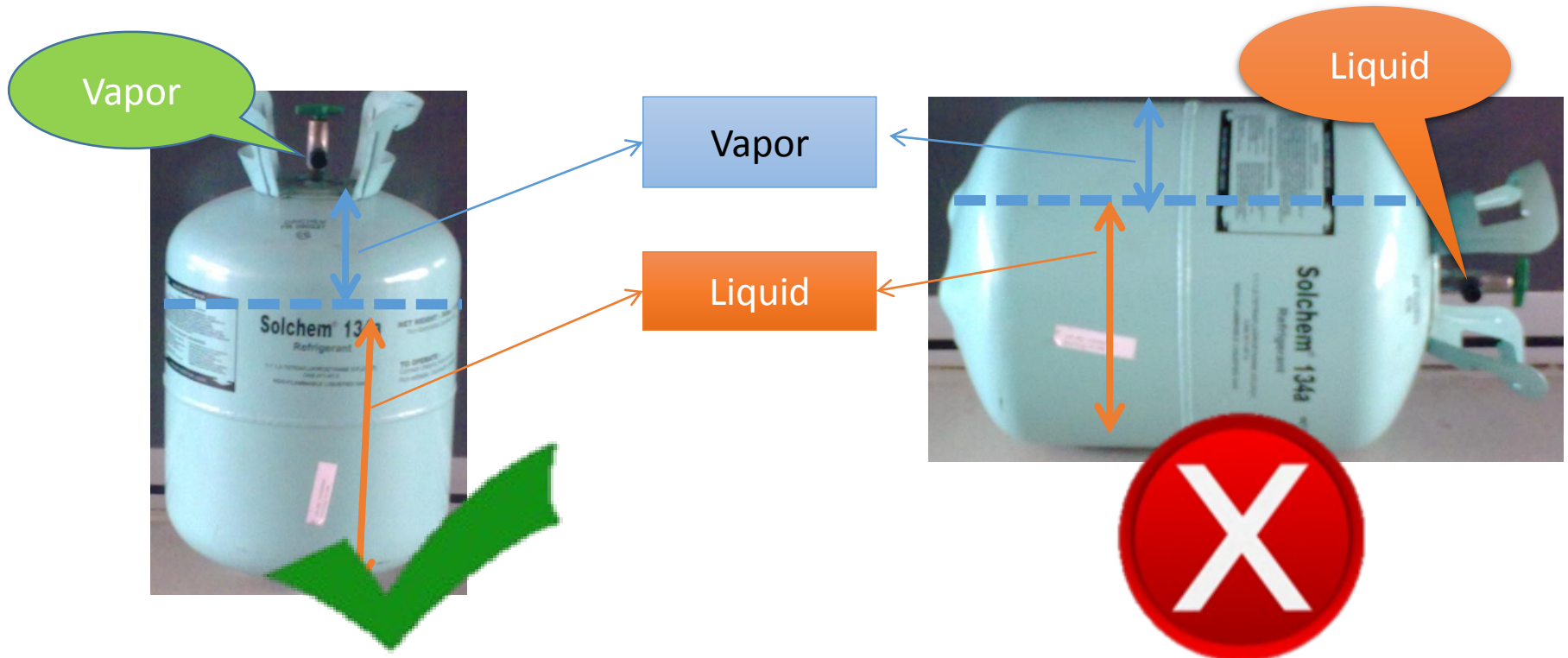
- **Battery Charger Warning:** When charging the optional battery with the 1000mA charger, the charger will become warm. If the charger becomes hot, unplug the charger immediately!

When charging multiple battery packs, allow the charger to cool between each



WARNING!!!!

- ***VAPOR*** SAMPLES ***ONLY!*** INTRODUCING “LIQUID” REFRIGERANT WILL CAUSE SERIOUS DAMAGE TO THE IDENTIFIER AND WILL **VOID** THE WARRANTY



Cautions and Warnings

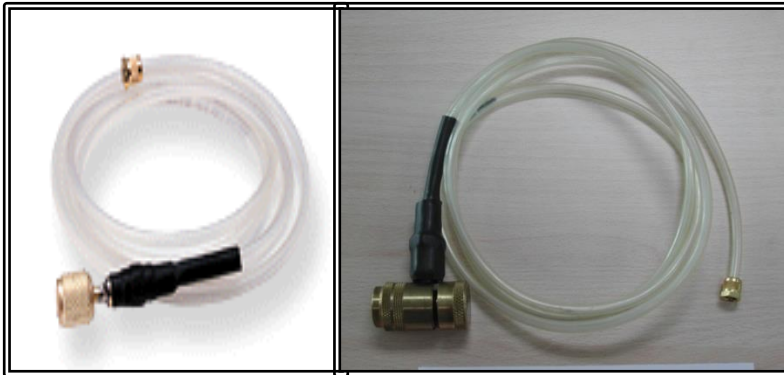


- ▶ DO NOT remove the top panel of the instrument. There are no serviceable components internal to the instrument.



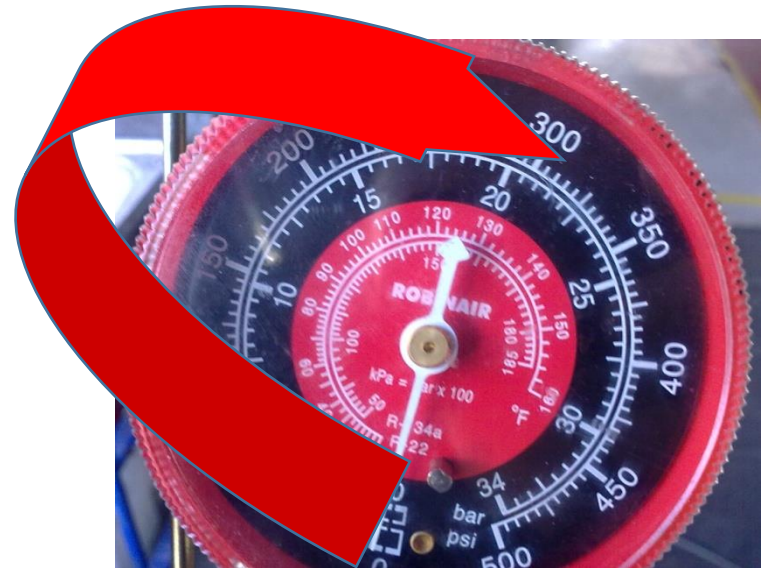
Cautions and Warnings

>DO NOT utilize any other hose other than those supplied with the instrument. The use of other hose types will introduce errors into the refrigerant analysis.



Cautions and Warnings

- NEVER admit any sample(Refrigerant) into the instrument at pressures in excess of 300 psig.



Cautions and Warnings



- NEVER obstruct the air intake, sample exhaust or case vent ports of the instrument during use.



Functional Description



- TO determine the weight concentrations of refrigerant types :
R12, R134a, R22, as well as, hydrocarbons and air.
- Refrigerant purity is automatically determined for refrigerants R12 and R134a by the instrument to eliminate human error. Pure refrigerant is defined as a refrigerant mixture that contains 98%, by weight, or greater of either R12 or R134a.

A green starburst graphic with a blue outline, containing the text "98%".

98%

Functional Description-Addition



- In addition , the unit will indicate the presence of R410a if the refrigerant tested matches the internal profile established for virgin R410a. Refrigerant purity is displayed on the LCD Screen. The user must determine acceptable levels of purity based on their recovery or use standards.

A green starburst graphic with a blue outline, containing the text "R410A" in white.

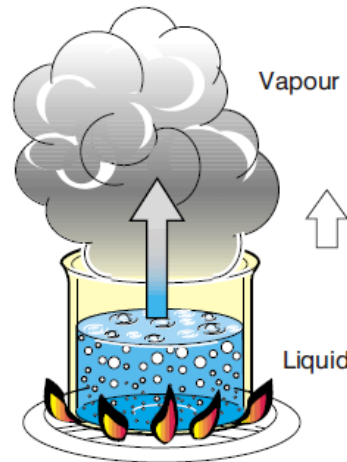
R410A

Basic refrigeration cycle consist of 2 changing states.

- Vaporisation
- Condensation

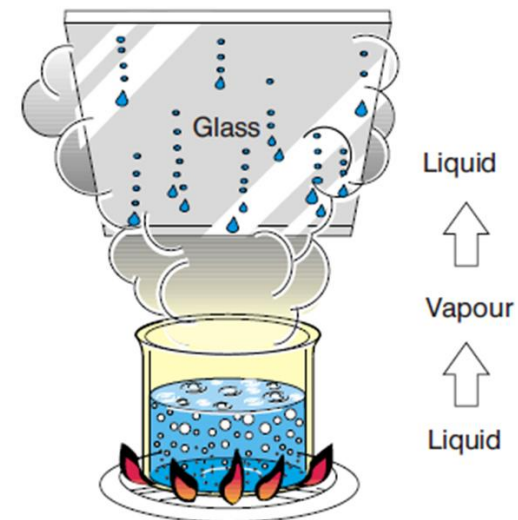
VAPORISATION

- In the term used when enough heat is added to a liquid substance to change it into a vapor (gas). For example: when water is boiled. This condition occurs within the A/C system



CONDENSATION

- Is the term used to describe the opposite of the evaporation process, if you take a vapour and remove enough heat from it, a change of state occurs. The vapour becomes a liquid. The change of vapour to a liquid is called condensation.



REFRIGERATION CYCLE



- A cycle is a series of operations where it is continuous. A refrigeration cycle is a continuous cycle where refrigerant absorb heat from the passenger compartment and then transfer the heat to the outside air (ambient).
- The series of operation consist of 4 phases:-
 - Vaporisation
 - Compression
 - Condensation
 - Pressure Reduction.

THE REFRIGERATION CYCLE

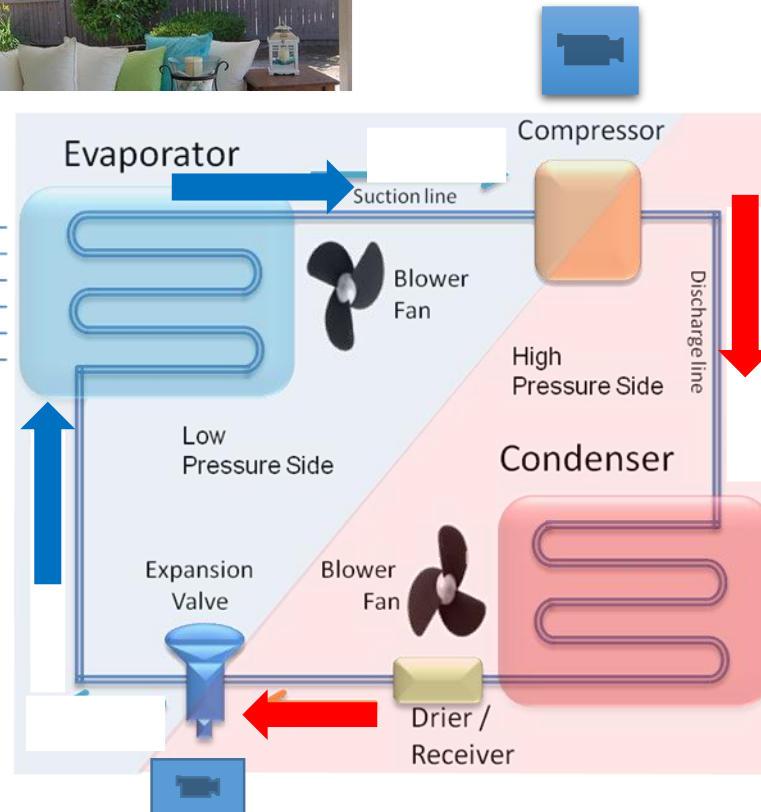


Vaporisation

Heat is absorbed in the evaporator and causes the refrigerant to boil from liquid to vapour

Pressure reduction

Liquid refrigerant at a high pressure is delivered to an expansion valve/capillary tube causes a reduction in pressure.



Compression

The refrigerant vapour is then compressed and moves to the condenser, the refrigerant is now a high temperature, high pressure vapour.

Condensation

As the refrigerant expels heat, the refrigerant condenses to a liquid. At the condenser outlet, the refrigerant is a high pressure liquid. The high pressure liquid refrigerant is delivered to the metering device and the sequence begins again.

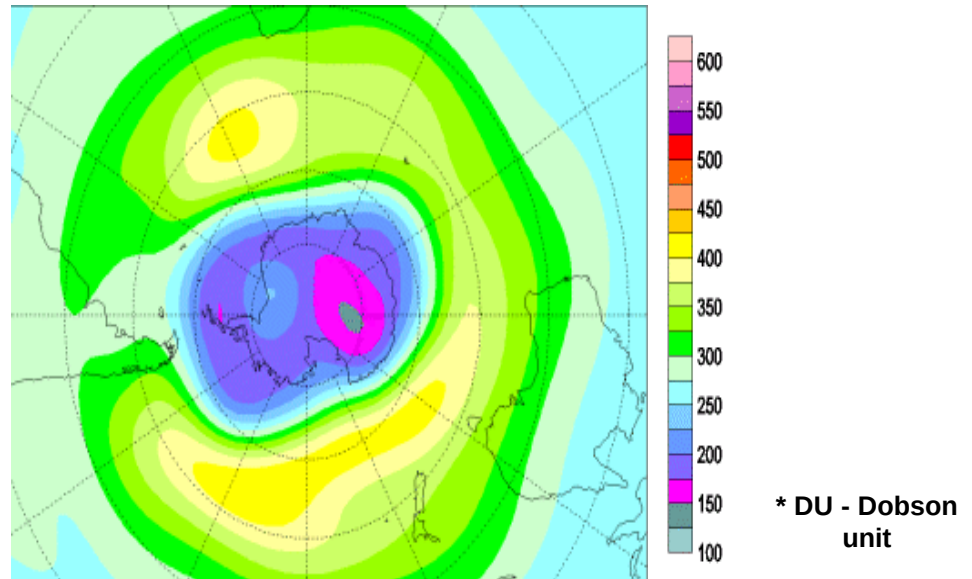
REFRIGERANT RECOVERY- REASONS?

CFC & HCFCs

- Destroy the ozone layer
- Cause global warming

HFCs

- Cause global warming



4.2 RECOVERY



- The process of removing refrigerant in any condition from a refrigeration system and storing it in an external container without testing or processing in any manner.
- Standard requirements :
 - • ISO 11650
 - • ARI 740
 - • EN 35421

TYPE OF RECOVERY MACHINE

- 1. Oil less compressor
- 2. Oil type compressor with oil separator



Oil less compressor



Oil type compressor with oil separator

- **Recycle:** to reduce contaminants in used refrigerants by separating oil, removing non-condensable gas, and by using devices such as filter driers to reduce moisture, acidity and particulate matter.
- Recycling involves reducing the levels of contaminants prior to reuse. Contaminants can result in early system failure.(Contaminants include oil, moisture, acid, chlorides, particulates, and non-condensable gases.)
- International Organization for Standards (ISO) 11650, Society of Automotive Engineers (SAE) J1990 ,2788 or AHRI 740-1998 standards may be used to measure recovery recycling equipment performance.

RECYCLING MACHINE



- Recover and recycle
- Vacuum
- Leak test
- Compressor oil inject
- Charging by scale monitoring



- **SAE-2099**
- **SAE-2788**
- **EN**

SAE J2099—Standard of Purity for Recycled HFC-134a (R-134a) for Use in Mobile Air-Conditioning Systems

- **Solution to reduce refrigerant impact on the greenhouse effect**

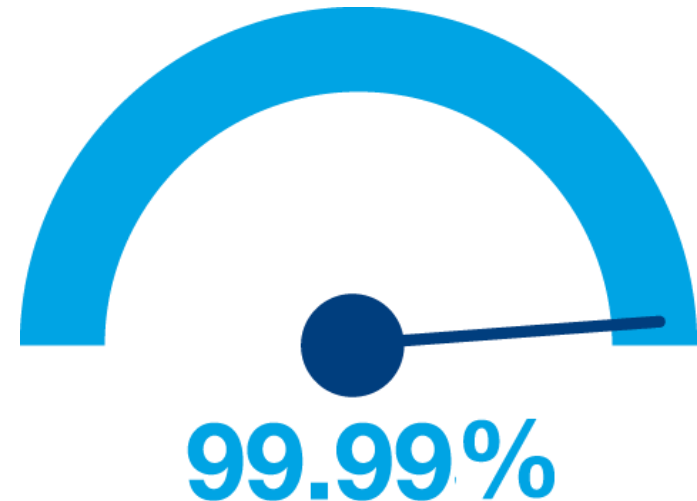
A new SAE standard was published in December of 2006 for recycling and charging equipment. The new standard call for A/C refrigerant management equipment with enhanced capabilities:

1. The machines must remove 95 percent of the refrigerant within 30 minutes with no heat being applied to the A/C system.
2. The machines must charge with an accuracy of +/- 0.5 ounce. This is required due to improved A/C systems with very small refrigerant capacities.

- Reclamation : Return refrigerant to virgin (purity) specifications, meet ARI 700 Standards for resale.

The following ratings are verified by test for the Reclaimed Refrigerant Certification Program:

- a. Water (ppm by weight).
- b. Chloride (pass/fail).
- c. Acidity (ppm by weight).
- d. High Boiling Residue (% by volume).
- e. Particulates/Solids (pass/fail).
- f. Non Condensables (% by volume).
- g. Volatile Impurities Including Other Refrigerants (% by volume).



Reclamation Centre Malaysia



Westtech Chemicals Sdn Bhd

5, Jalan Pelabur 23/1,
40300 Shah Alam,
Selangor Darul Ehsan.

Tel : +603 - 5541 - 0612

Fax : +603 - 5541 - 0132

Reclamation Centre Malaysia



Aurora Chemicals Sdn. Bhd.

**No. 3, Jalan Meranti Jaya 14, Meranti
Jaya Industrial Park, 47120 Puchong,
Selangor**

Phone: 03-8062 3110

DEFINITION OF CONTAMINATED REFRIGERANT

- Two or more undesired types of refrigerants mixed in a cylinder or in a refrigeration system which affect the performance of the refrigerant.



EFFECT OF CONTAMINATED REFRIGERANT TO THE RAC SYSTEM



- Damage R & AC system;
- Reduce cooling capacity and consume more electrical energy and reduce efficiency system;
- Explosion may occur.

STEP 1 : IDENTIFIER THE REFREGERANT

COOLTECH



STEP 1 : IDENTIFIER THE REFREGERANT



- Cross-Contamination: Contamination on a system cause by improper handling during servicing i.e. when refrigerants recovery cylinders are used for refill the different refrigerants. This will seriously affect appliance performance



DEFINITION OF CONTAMINATED REFRIGERANT

- Refrigerant Contaminants: Refrigerant systems can be contaminated by contaminants like moisture, non-condensable air, chemical residues, dirt or dust.



Reclaim

- TRANSFER



ASHRAE Standard



FLAMMABILITY	 3	R-600a (isabutane) R-290(propene)	R-1140 (vinyl chloride)
	 2	HFC-143a HFC-152a	R-717 (Ammonia)
	 2L	HFC-32 HFO-1234yf HFO-1234ze	
	1	CFC-11 CFC-12 HCFC-22 HFC-125 HFC-134a HFC-410A	HCFC-123
CATEGORY	A Lower Toxicity	B Higher Toxicity	
	TOXICITY		
ASHRAE Standard 34 Matrix with some Refrigerant Examples			

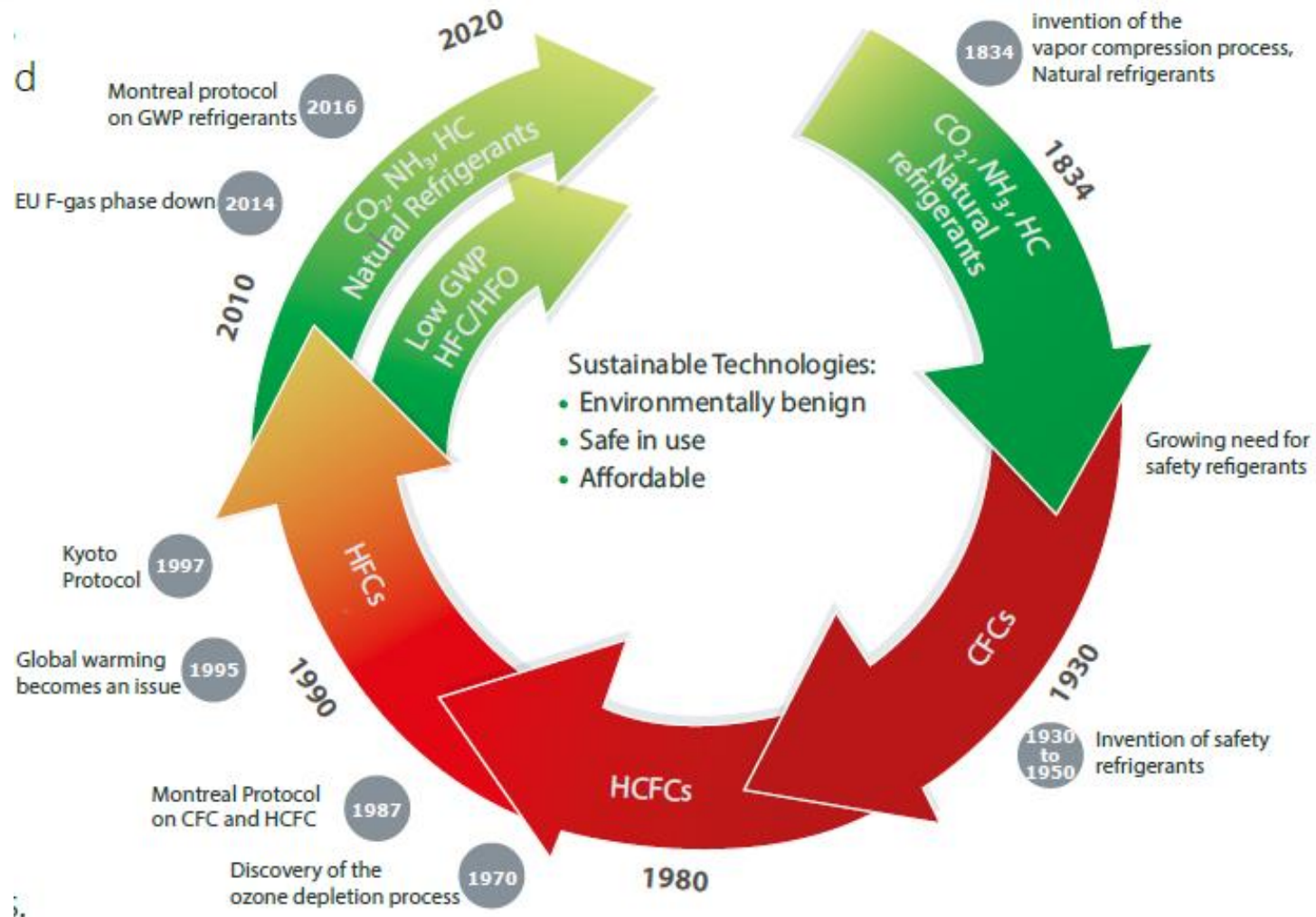
Flammable Refrigerant



Refrigerant		Density of vapor kg/m3	Safety group	LFL, kg/m3	LFL, %	Auto ignition temp, °C	PL, kg/m3	GWP
Group	Type							
HC	R600a	2.48	A3	0.038	1.8	460	0.011	3
	R290	1.86	A3	0.038	2.1	470	0.008	3
	R1270	1.77	A3	0.047	2.7	455	0.008	3
HFO	R1234ze	4	A2L	0.299	6.5	405	0.06	6
HFC	R32	1.86	A2L	0.307	14.4	648	0.061	550

Overview

Historical Cycle of Refrigerant



Basic knowledge of refrigerant air conditioning system-**R12**



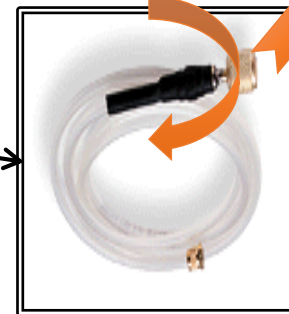
1. Cylinder R12 – White colour

➤ Dichlorodifluoromethane

➤ CFC-12

➤ Joint: 1/4 "

➤ R12 Sample Hose



Automotive & Freezer

Basic knowledge of refrigerant air conditioning system-R12



CFC 12: Properties & Alternatives

- CFC 12 is considered the most widely used refrigerant in the MAC sector because of its excellent properties in refrigeration.
- Why CFC 12 needs to be phased-out:
 1. High ozone depletion potential (**ODP=1.0**).
 2. High contribution to global warming.

Best Alternative to CFC 12: R134A



- Have most of the good refrigerant characteristics.
- Have similar properties like CFC 12, but with zero ODP (ozone depletion potential) and low GWP (green-house warming potential).
- Only disadvantage: smaller molecular size

Basic knowledge of refrigerant air conditioning system-R134a



Cylinder R134a – Light blue colour

➤ **1,1,1,2-Tetrafluoroethane**

➤ **HFC-134a**

➤ **Joint :1/2"**

➤ **½" Acme Thread (Thread onto Cylinder Stub)**

➤ **R134a Low Side Stub (Fits into R134a Low Side Coupler)**

➤ **R134a Sample Hose**



Automotive & Freezer

Basic knowledge of refrigerant air conditioning system-R22

COOLTECH

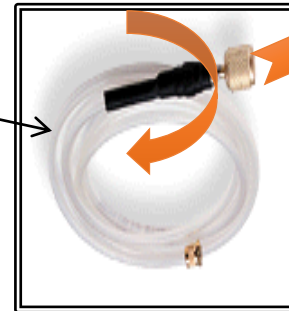
. Cylinder R22 – Green colour

➤ Chlorodifluoromethane

➤ HCFC-22

➤ Joint: 1/4"

➤ R12 Sample Hose



Split unit

R410A: Properties & Alternatives

R410A

1. Cylinder R410A – Pink colour

➤ HydroFluorCarbons

➤ R410a

➤ Joint: 1/4 "

➤ R12 Sample Hose

➤ Packing: 11.3kg

➤ R-32 Difluoromethane (50% weight),
R-125 Pentafluoroethane (50% weight)



HVAC

Basic knowledge of refrigerant air conditioning system-R410A



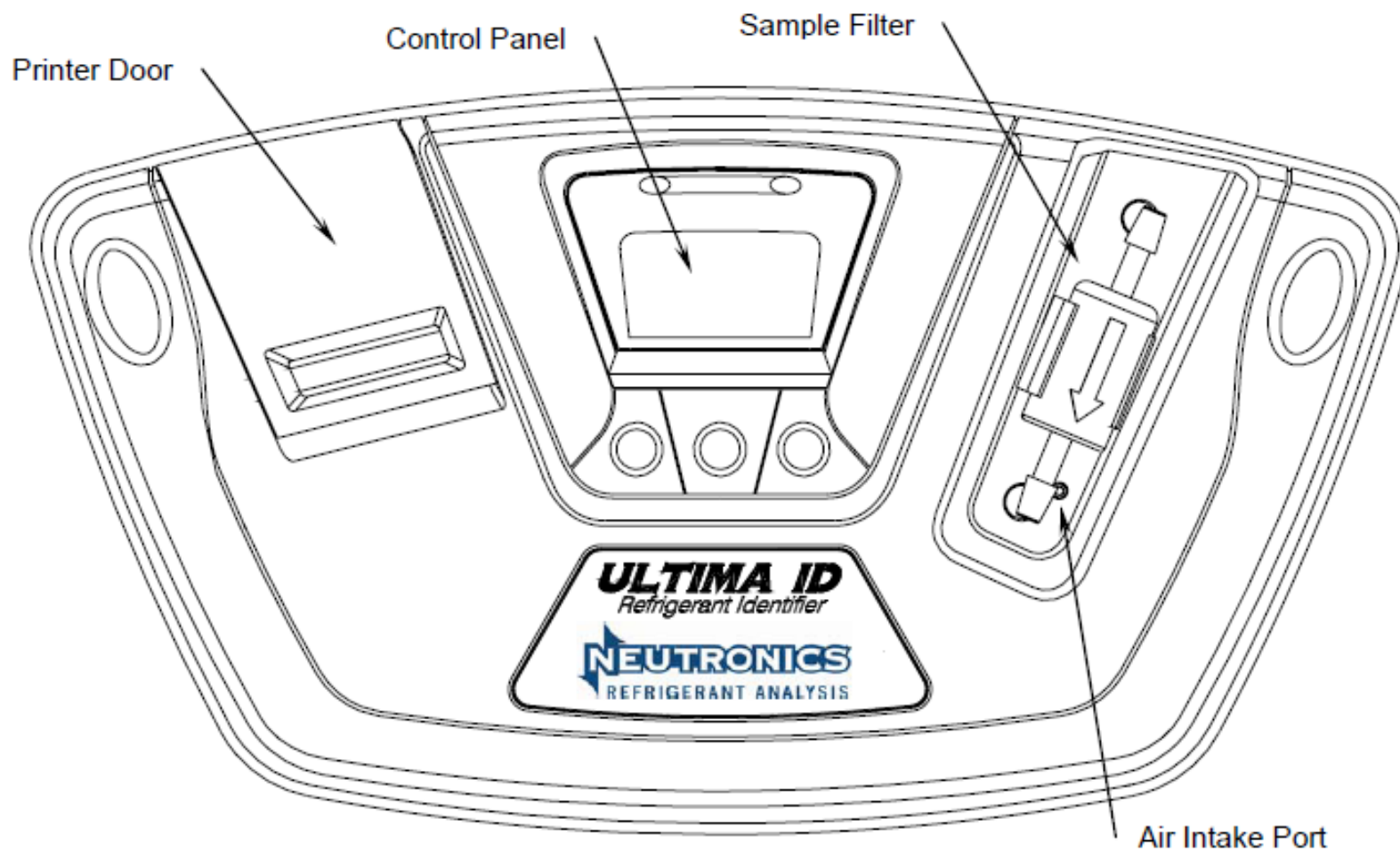
R410A: Properties & Alternatives

- ▶ R-410A refrigerant was developed as an environmentally friendly and more efficient alternative to replace R-22 (Freon). R-410A refrigerant--also known as Puron--does not deplete the ozone the way R-22 does but does have a higher global warming potential than the R-22 coolant.

Table 2: Refrigerant ODP & GWP Values

Refrigerant Type	Name	ODP	GWP (100 year horizons)
HCFC	R22	0.055	1700
HFC	R404a	0	3784
HFC	R410a	0	1975
HC	R290	0	20

Hardware Description



Hardware Description



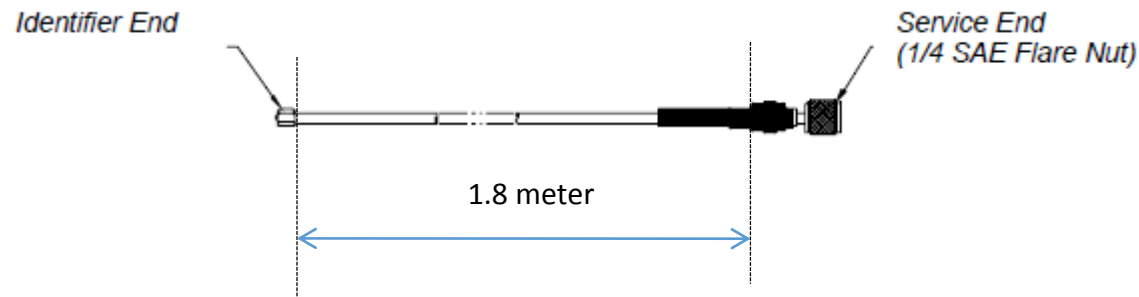
Sample Filter

The **disposable filter** is to the left of the pressure gauge. The filter is a coalescing type with the added feature of a color coded dye to detect the presence of oil. **The filter turns red whenever the element has been contaminated and needs to be replaced.**

Hardware Description



- R12 Sample Hose



Hardware Description



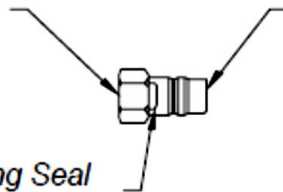
- R134a Sample Hose



- R134a Tank Adapter Fitting

*1/2" Acme Thread
(Threads onto Cylinder Stub)*

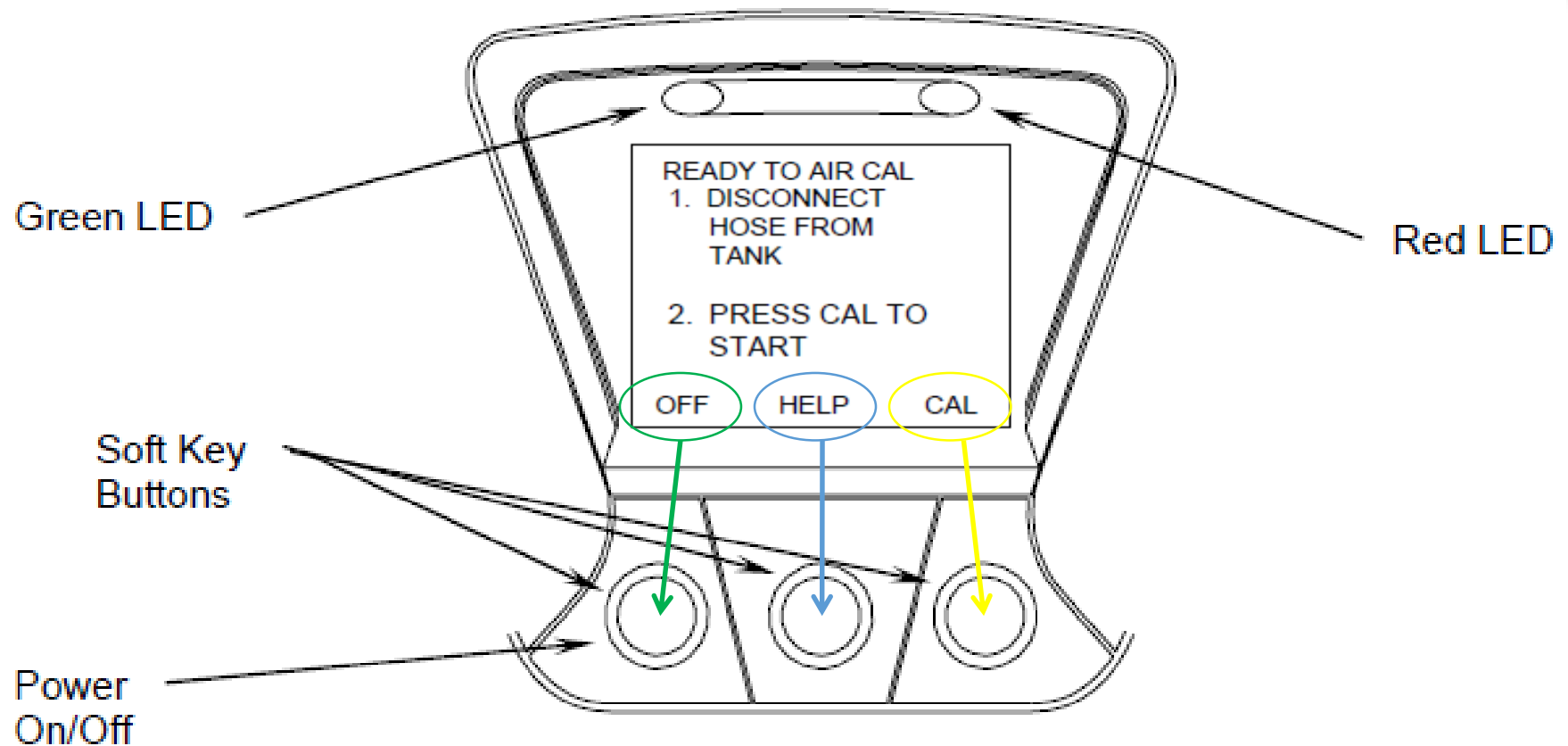
*O-Ring Seal
(Internal)*



*R134a Low Side Stub
(Fits into R134a Low Side
Coupler)*



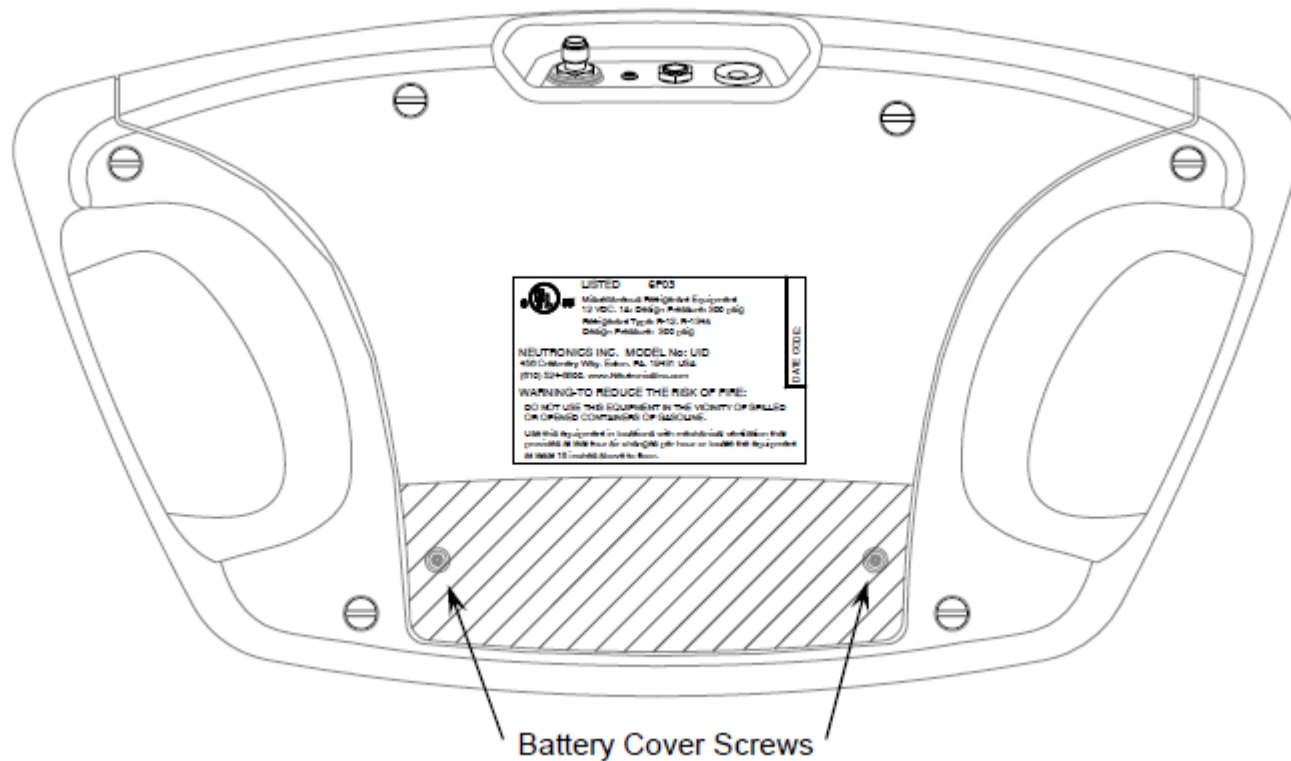
Hardware Description



First Use



Note: Charge the battery for a minimum of 4 hours with the supplied charger prior to first use.

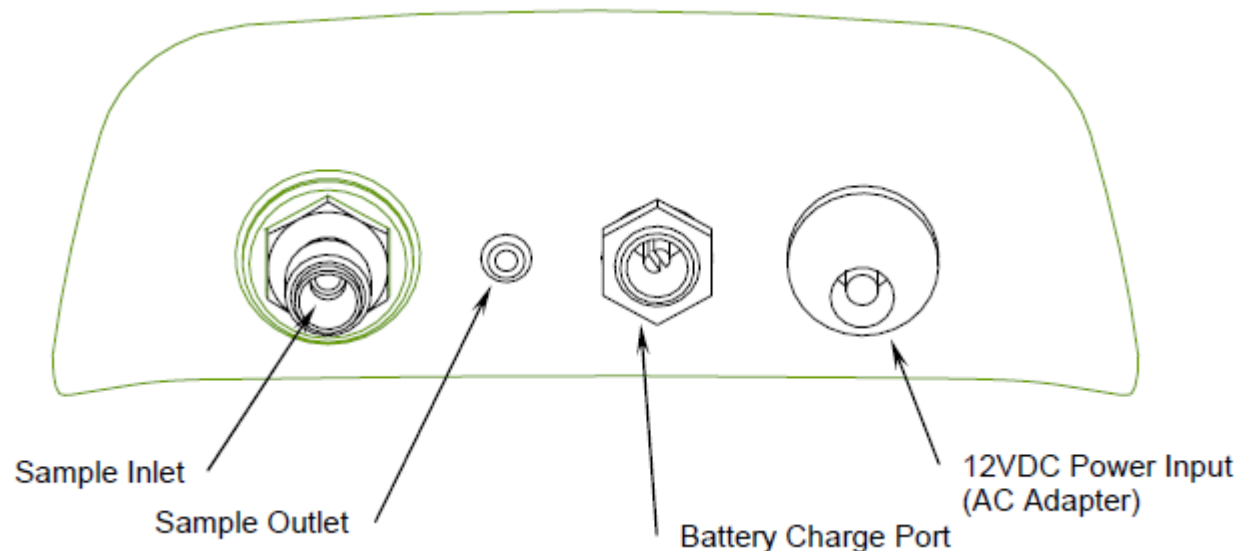


Hardware Description



Back Panel Connections

- The connections located on the back panel are illustrated below.
- **CAUTION:** The sample outlet port should never be obstructed. Keep the sample outlet port free and clear at all times.



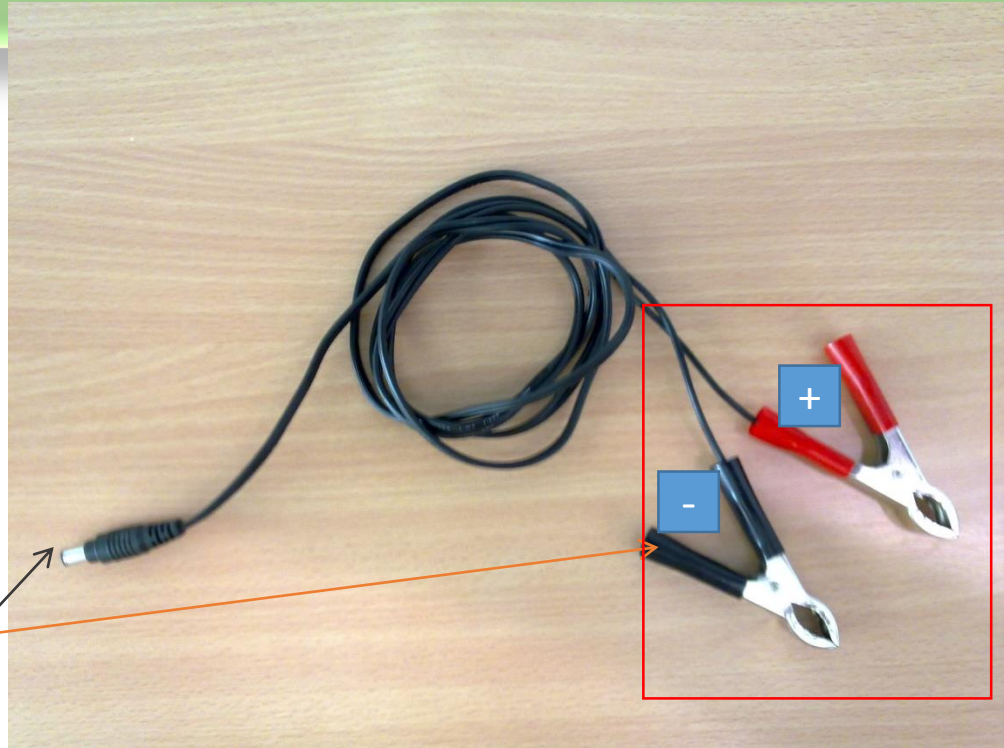
AC Power Adaptor

- Input = 110/240 V
- Output=25V (without Battery)

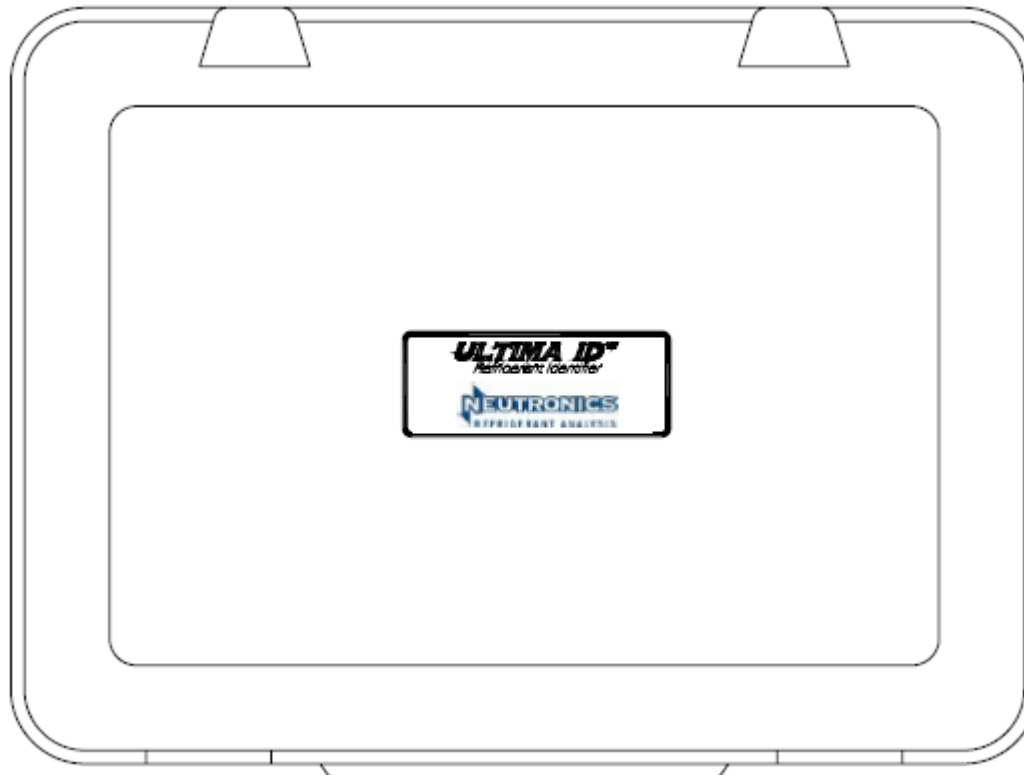


12V Battery Clip

- Input = 12V DC
- Output=12V DC



- **Hard Shell Storage/Carrying Case** The hard shell storage/carrying case is custom fit to the Ultima ID - HVAC. It provides rugged protection for the instrument as well as convenient storage for all components. The enclosure is general purpose and is not watertight.



Wiring Diagram

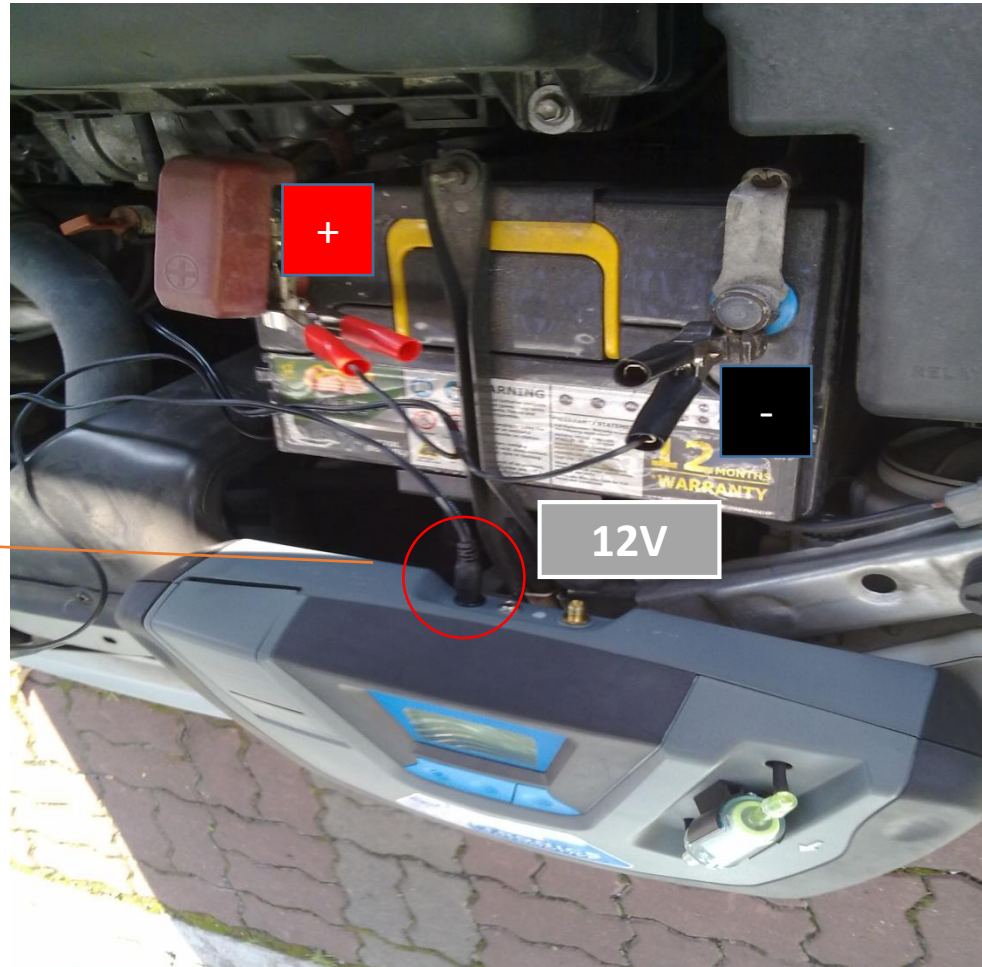
COOLTECH

▶ 240V Connection-Charging



Wiring Diagram

▶ 12V Connection-Vehicle Power Cable

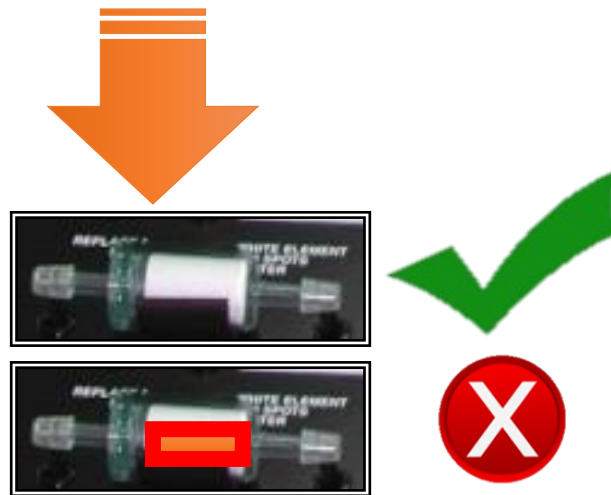


Standard Operation Procedure

Pre-Operational Procedure

Step 1

If any red spots or discoloration are noticed, REPLACE THE FILTER BEFORE USING THE INSTRUMENT



Standard Operation Procedure



Pre-Operational Procedure

Step 2

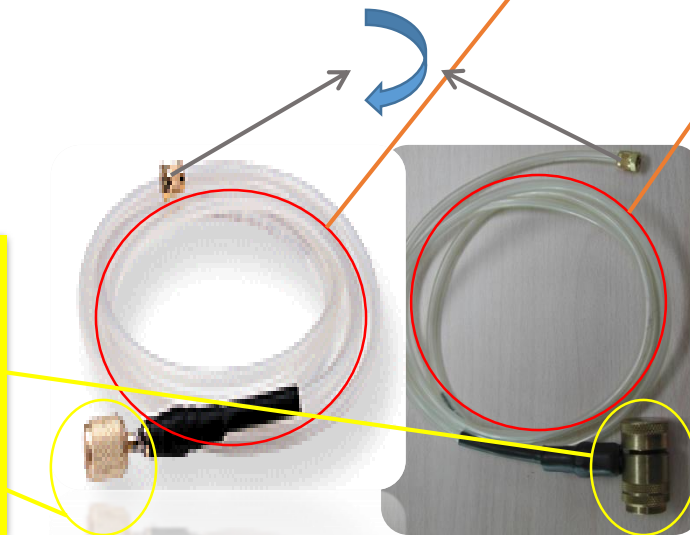
c.

Install the selected sample hose onto the inlet port.

Finger tightened to achieve a gas-tight seal.

b.

Inspect the hose for signs of wear such as cracking, not obstructed and that of no oil. Replace (OR CLEANED) BEFORE USING THE INSTRUMENT!



a.

Select the R12 or R134a sample hose for use in the specific application.

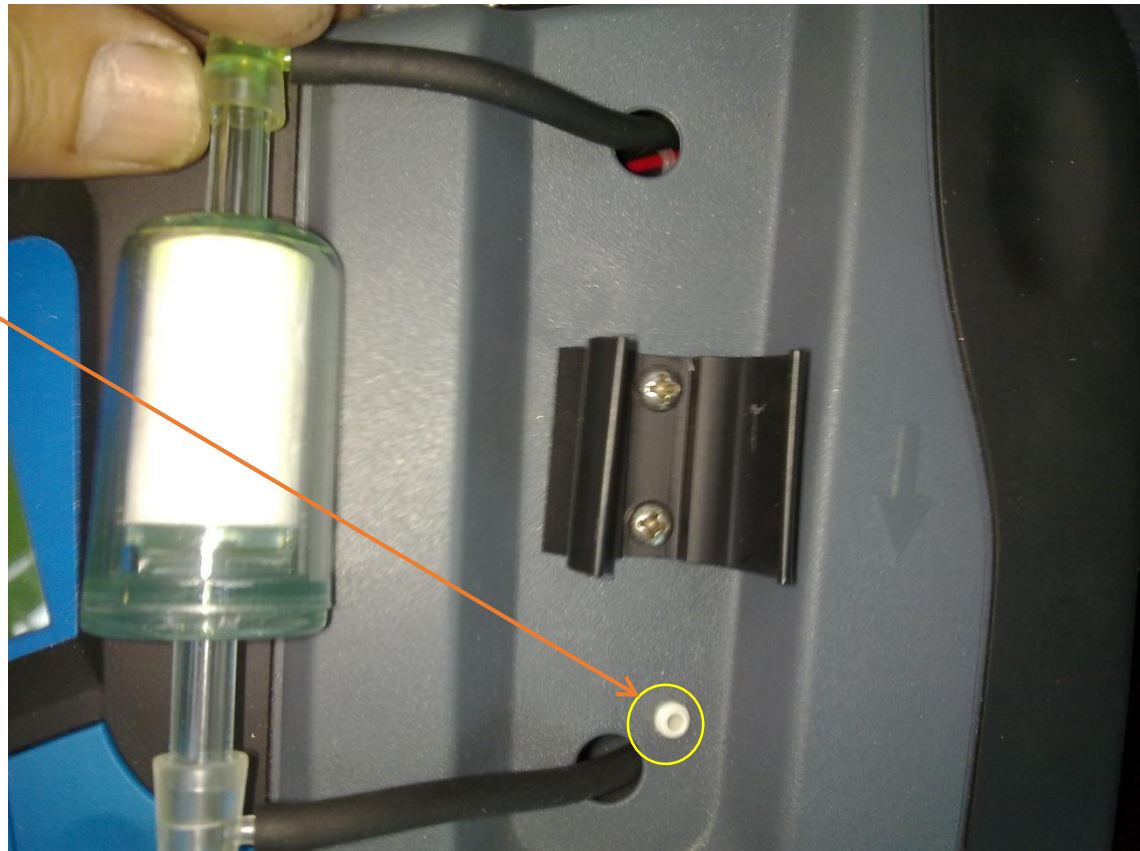
Standard Operation Procedure



Pre-Operational Procedure

Step 3

Inspect the air intake port, the sample exhaust port and the case vent ports.-clear and unobstructed



Standard Operation Procedure



Pre-Operational Procedure

Step 4

Make sure the sample port is low side or vapor port.



Low Side
Vapor
No Oil



High Side
Liquid
Oil



Standard Operation Procedure



Step 1

- Plug The 12V battery clip or battery pack .



OR

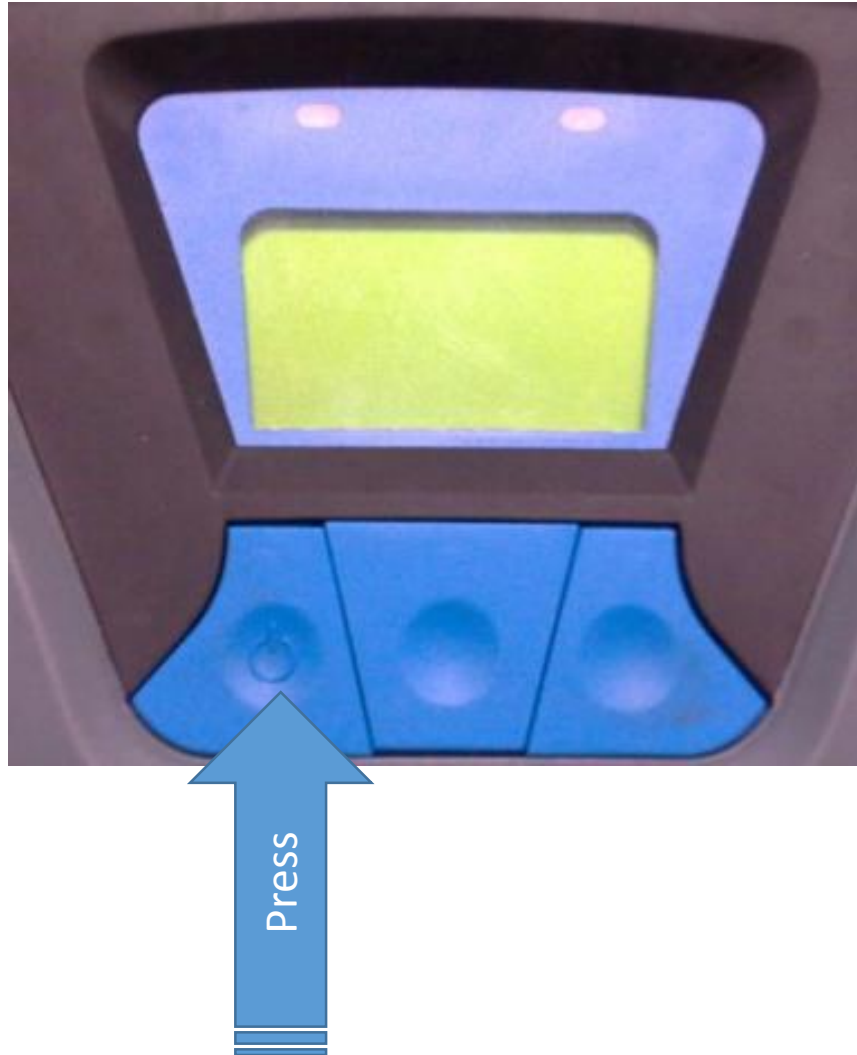


Standard Operation Procedure



Step 2a

- ON the power by pressing:



Standard Operation Procedure



Step 2b

- Display Show:

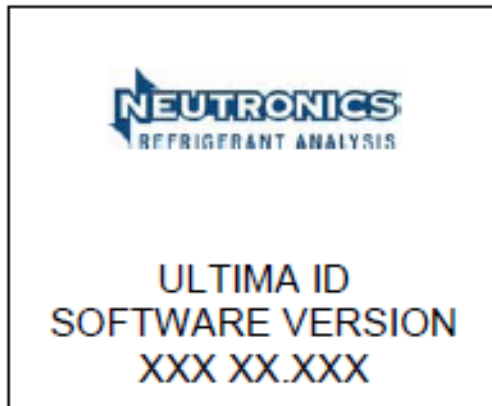


Figure 1

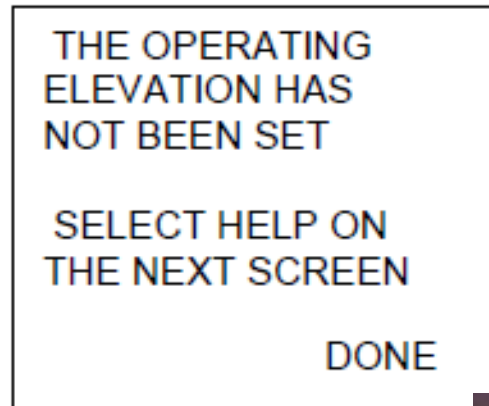
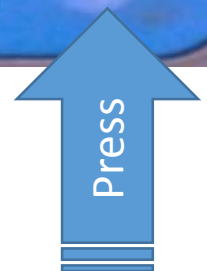
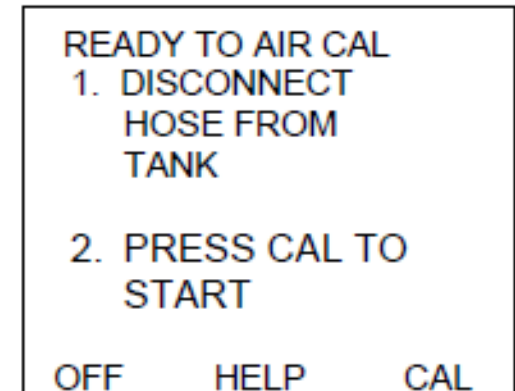


Figure 2



Standard Operation Procedure



Step 3

- Calibration Process

30 seconds

CALIBRATING
THIS WILL ONLY
TAKE 30 SECONDS

Figure 4

- CALIBRATING -
NOTE
REPLACE FILTER
WHEN WHITE
ELEMENT BEGINS
TO SHOW RED
SPOTS ON OUTSIDE
DIAMETER

Figure 5

CALIBRATION TIME
HAS EXPIRED
DISCONNECT HOSE
FROM TANK AND
PRESS CAL TO
RECALIBRATE

CAL

Figure 6



Standard Operation Procedure



Step 4

4a.

Calibration Complete

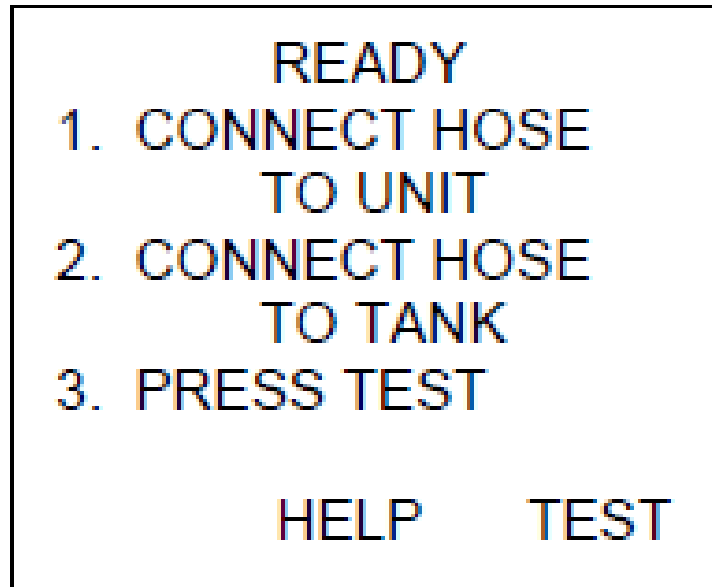


Figure 7

Standard Operation Procedure

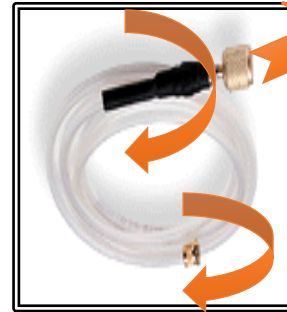
COOLTECH

4b.

Connect the sample hose

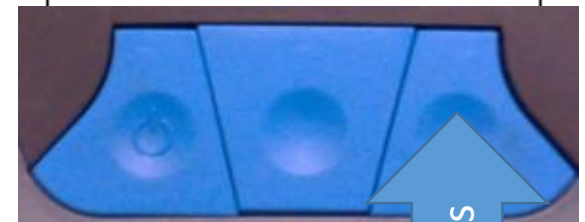
Open the valve

Press button TEST



- READY
1. CONNECT HOSE TO UNIT
 2. CONNECT HOSE TO TANK
 3. PRESS TEST

HELP TEST



Standard Operation Procedure



- Step 5
- Analysis Process

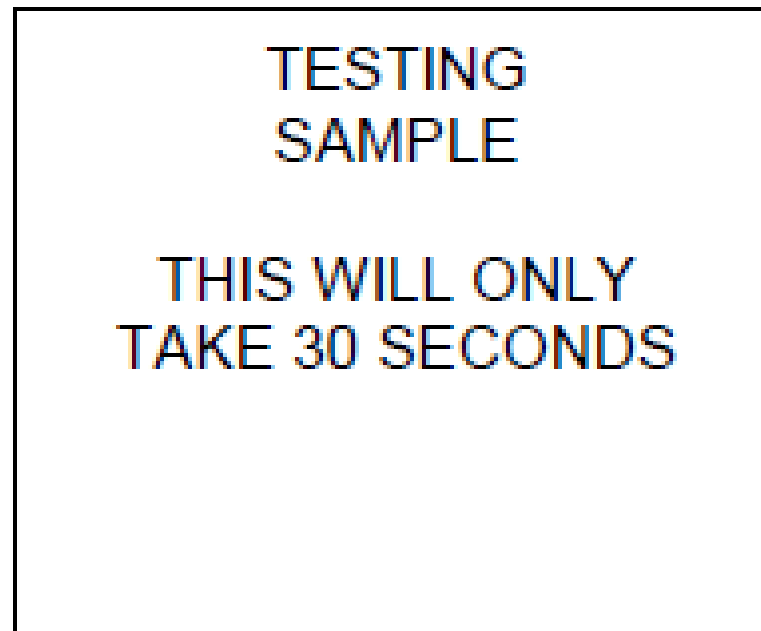


Figure 8

Standard Operation Procedure

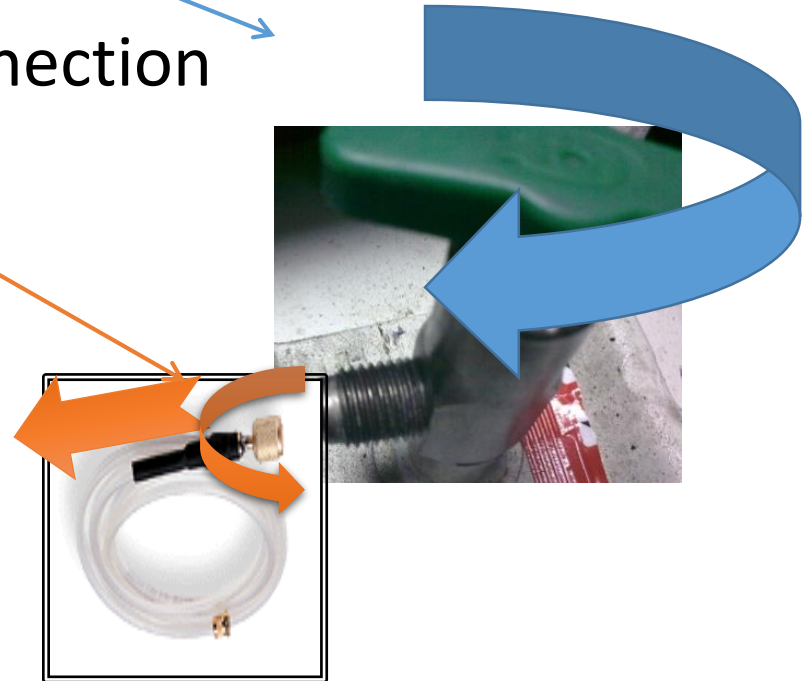


Step 6

- Analysis Completed

Close the valve

Disconnect the sample connection



Standard Operation Procedure



Step 7a

Result Show.

RESULTS

R134a	XX.X
R12	XX.X
R22	XX.X
HC	XX.X
AIR	XX.X

EXIT

PRINT

90 % Pure or better

RESULTS

DET - 1	XX.X
DET - 2	XX.X
DET - 3	XX.X
DET - 4	XX.X
NON	XX.X

EXIT

PRINT

Less than 90 % Pure

Standard Operation Procedure

COOLTECH

Step 7b

Blend Refrigerants

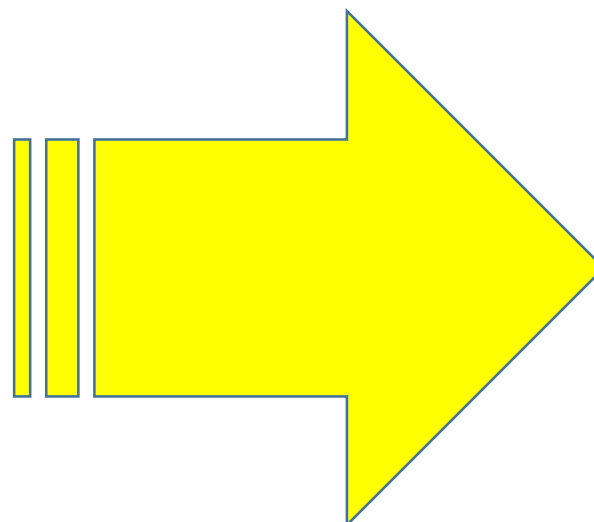
Result Show.

RESULTS	
DET - 1	XX.X
DET - 2	XX.X
DET - 3	XX.X
DET - 4	XX.X
NON	XX.X

EXIT MORE PRINT

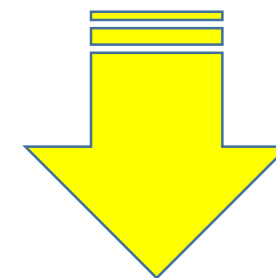


Press



PROBABLE R410A REFRIGERANT	
EXIT	DONE

OR



Standard Operation Procedure



Step 7C

Blend Refrigerants

Result Show.

RESULTS

DET - 1 XX.X

DET - 2 XX.X

DET - 3 XX.X

DET - 4 XX.X

NON XX.X

EXIT

PRINT

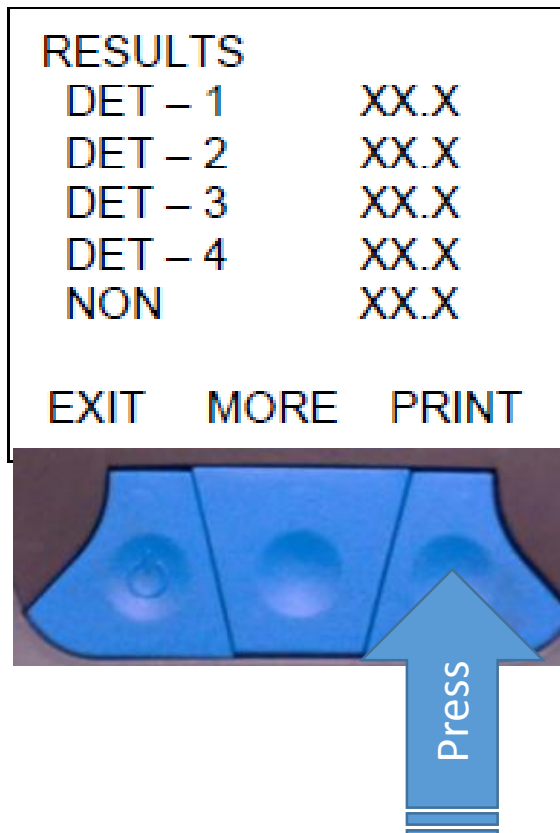
Blend	Det -1	Det -2	Det -3	Det -4	Non
R401A	<10	<10	85-95	0	0
R401B	<10	<10	87-97	0	0
R402A	<10	<8	75-95	<10	<20
R402B	<10	<6	87-97	<10	<6
R407C	70-90	<6	<5	10 - 25	15-35
R408A	45-65	0	35-55	0	0
R409A	<10	<15	75-95	0	0
R502	50-70	0	30-50	0	0

Standard Operation Procedure



Step 8

- Printing the Test Results by pressing button PRINT:



Neutronics Inc.
Refrigerant
Identifier

R134a	.0
R12	.0
R22	100.0
HC	.0

(Date)

(Technician)

Neutronics Inc.
Refrigerant
Identifier

DET - 1	XX.X
DET - 2	XX.X
DET - 3	XX.X
DET - 4	XX.X
NON	XX.X

Probable R410a

(Date)

(Technician)

Neutronics Inc.
Refrigerant
Identifier

DET - 1	XX.X
DET - 2	XX.X
DET - 3	XX.X
DET - 4	XX.X
NON	XX.X

(Date)

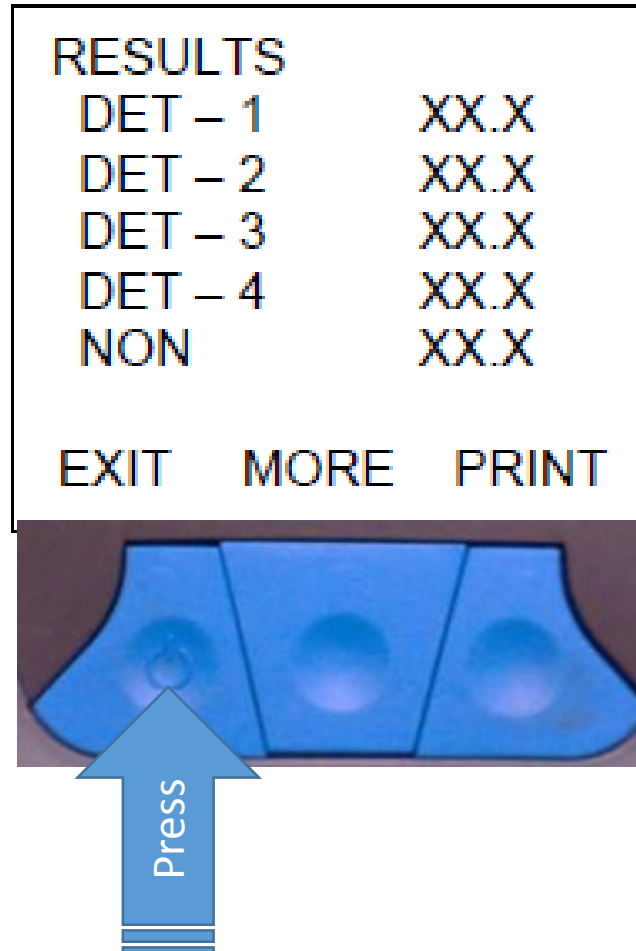
(Technician)

Standard Operation Procedure



Step 9

- Exit by pressing button EXIT:

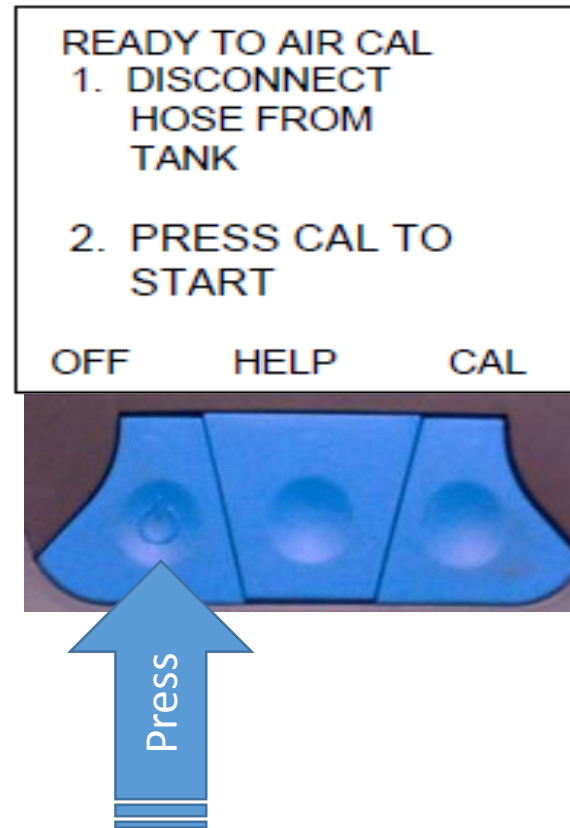


Standard Operation Procedure



Step 10

- Power off by pressing button OFF:

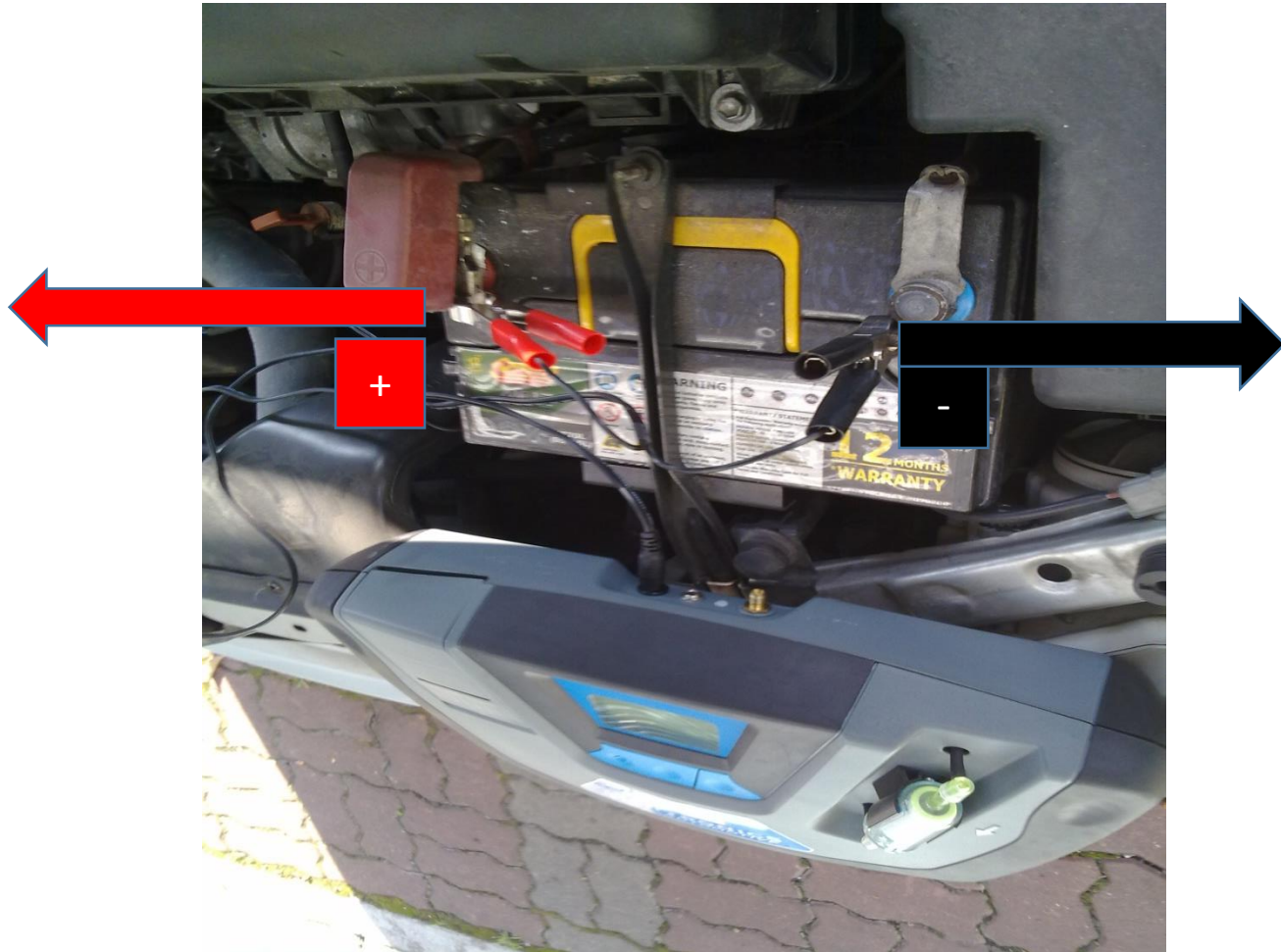


Standard Operation Procedure



Step 11

- Dismantle the 12V battery clip.



Standard Operation Procedure



Step 11

- Store the item in the Case





Practical Demonstration

Thank You