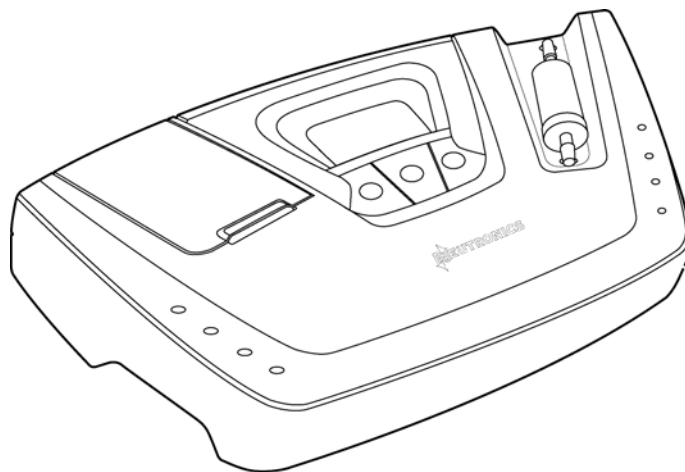




***ULTIMA ID - HVAC<sup>TM</sup>***  
REFRIGERANT IDENTIFIER  
**OPERATION MANUAL**

Manual Part Number: 5-06-7000-69-0  
Manual File MN-A-0133 Rev. B

Revised: August 28, 2007



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## For Your Safety:

**PLEASE READ THIS MANUAL IN ITS ENTIRETY BEFORE ATTEMPTING INSTALLATION OR OPERATION! Attempting to operate the Ultima ID - HVAC without fully understanding its features and functions may result in unsafe conditions**

- Always use protective eye wear and observe proper safety procedures when working with pressurized gases.

**Read and understand the entire manual BEFORE attempting to operate the instrument.**

## Identifier Warnings

- **Refrigerant Blend Warning:** The HVAC industry is ever evolving new refrigerants. These new blends can be profiled using the Ultima ID. A list of tested refrigerants and their characteristics is provided in the appendix of this manual. We strongly suggest that you test any newly introduced refrigerants and record their characteristics in the Appendix section for future reference.
- **Sample Filter Warning:** Replace the sample filter of the instrument AS SOON AS RED SPOTS OR DISCOLORATION BEGIN TO APPEAR ON THE OUTSIDE DIAMETER OF THE WHITE ELEMENT. Failure to properly maintain and replace the sample filter will result in severe damage.
- **Sample Input Warning:** The instrument requires connection of the supplied sample hose to the LOW SIDE OR VAPOR port of refrigerant storage cylinders or air conditioning systems. DO NOT attempt to introduce liquid or samples heavily laden with oil into the instrument. DO NOT connect the sample hose to the HIGH SIDE or LIQUID port!
- Liquid or oil laden samples will cause severe damage to the instrument that will not be covered under warranty repairs.
- **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 battery.

## General Cautions

- Always inspect the sample hose before each use. Replace the hose if it appears cracked, frayed, obstructed or fouled with oil.
- ALWAYS turn the compressor off before connecting the instrument to an air conditioning system.
- Always wear eye and skin protection when working with refrigerants. Escaping refrigerant vapors will present a freezing danger.
- To reduce the risk of electrical shock, do not disassemble the instrument; do not use the instrument in wet or damp areas.
- DO NOT direct refrigerant vapors venting from hoses towards the skin.
- DO NOT disassemble the instrument. There are no serviceable components internal to the instrument and disassembly will void the warranty.
- ALWAYS place the Identifier on a flat and sturdy surface.
- 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 and instrument calibration.
- ALWAYS verify that the refrigerant to be tested does not contain or will not emit heavy loads of oil or liquid.
- NEVER admit any sample into the instrument at pressures in excess of 300 psig.
- NEVER obstruct the air intake, sample exhaust or case vent ports of the instrument during use.

# WELCOME

## Thank you for purchasing the ULTIMA ID - HVAC Refrigerant Identifier.

The Ultima ID - HVAC is the most advanced refrigerant identifier ever designed for determining the purity of common gaseous refrigerants. It has many features to offer the user, which will be described in this manual. We recommend that all personnel who use this instrument read this manual to become more familiar with its proper operation.

For further information regarding the application, operation or spare parts, please contact the Neutronics Inc. Customer Service Department. If you have questions or comments, we would like to hear from you.

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# 1

## INTRODUCTION AND OVERVIEW

### 1.1 General

Contamination of refrigerants either in storage cylinders or air conditioning systems can lead to component corrosion, elevated head pressures and system failures when utilized by unsuspecting technicians. The ability of the technician to determine refrigerant type and purity is severely hampered by the presence of air when attempting to utilize temperature-pressure relations. The development of various substitute refrigerants further complicates the ability of a technician to identify refrigerant purity based upon temperature-pressure relationships. The substitute refrigerant blends can also introduce a flammability hazard to the technician and the ultimate end user of the air conditioning system.

The Neutronics Ultima ID - HVAC Refrigerant Identifier provides a fast, easy and accurate means to determine refrigerant purity in refrigerant storage cylinders or directly in air conditioning systems. The instrument utilizes non-dispersive infrared (NDIR) technology to determine the weight concentrations of refrigerant types R12, R134a, R22, as well as hydrocarbons. 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.

The instrument is supplied complete with an R12 (¼" Flare) sample hose, a 110/220 VAC power transformer and all required plumbing housed within a rugged, portable, storage case.

Sample gas is admitted into the instrument through the supplied sample hose and presented to the sensing device. The instrument provides the user with direct percent by weight concentrations of R12, R134a, R22 and hydrocarbons. If the sample is determined to be pure R134a, the instrument will provide a direct readout of the weight percentage of air within the sample. Note that the instrument does not consider air to be a contaminant since it can be removed by most refrigerant recycling equipment. Since air is not considered to be a contaminant, it is possible to read 100% R134a plus 5% air. The instrument only considers the weights of the refrigerant and contaminants in the total mixture for R134a as air contamination in R12 and R22 systems causes only minor performance degradation.

The instrument interfaces with the user with an LCD graphic display, status indicator lamps, push button communication switches and an alarm horn. Alarm indications are provided to alert of instrument fault conditions or contaminated refrigerant presence. Direct percent by weight concentrations of the sample refrigerant is provided on the display as well as user directions and prompts. An optional on-board printer (Model RI-2004HVP) is available to print an on-the-spot analysis report.

The Neutronics Ultima ID - HVAC Refrigerant Identifier provides the refrigerant technician with excellent knowledge of refrigerant purity and protection against refrigerant contamination and potential flammability.

## 1.2 Features

The Ultima ID - HVAC Refrigerant Identifier is the most advanced portable instrument ever manufactured for determining the purity of gaseous refrigerants for the HVAC-R market.

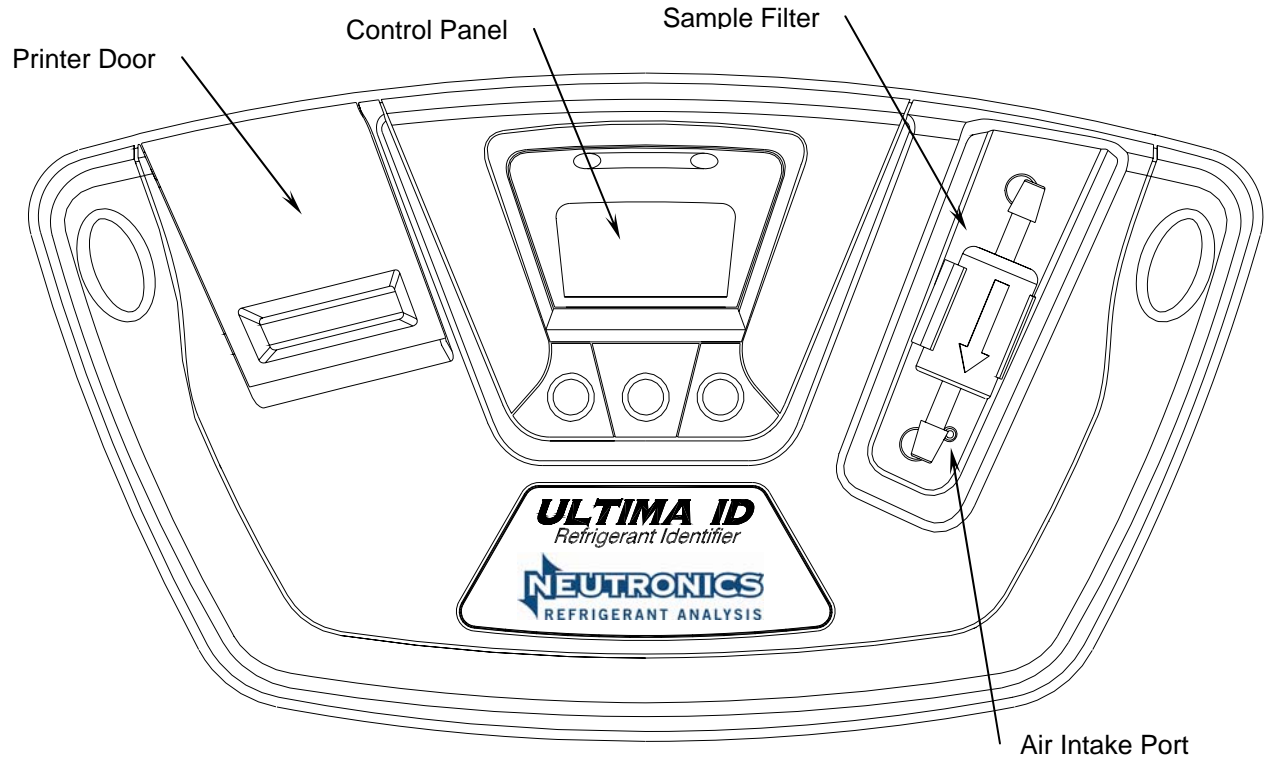
### Features Include:

- Advanced ergonomic design
- Rugged rubberized hand grips
- Large graphic display with on-screen instructions
- Ultra fast 60 second test time
- Blend-ID software to identify the presence of R410a
- Built in printer option for instant analysis report
- Internal, rechargeable battery option for cordless operation in any location
- Hard shell carry/storage case

## 1.3 Ultima ID - HVAC Components

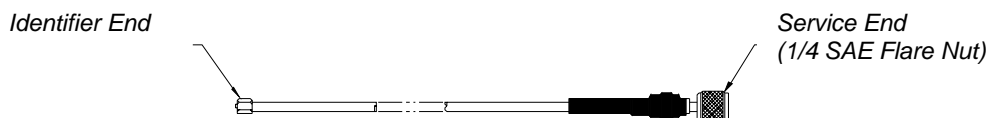
### 1.3.1 Ultima ID - HVAC Base Unit

The Ultima ID - HVAC base unit houses the Graphic Display, Infrared Bench, Electrical Connections, and Optional Printer Module. These components require no maintenance, therefore **there are no serviceable components internal to the instrument, and disassembly will void the warranty.**



### 1.3.2 R12 Sample Hose

The 6-foot (1.8 meter) R12 Sample Hose is constructed of a nylon inner tube and a polyurethane outer tube. The inner tube will handle all of the refrigerant transfer and will provide containment up to 300psig. The outer tube will provide protection of the inner tube from abrasion, nicking, cutting, etc. The hose is provided with an instrument inlet port mating connector on one end and a 1/4" SAE female flare coupling nut on the service end.

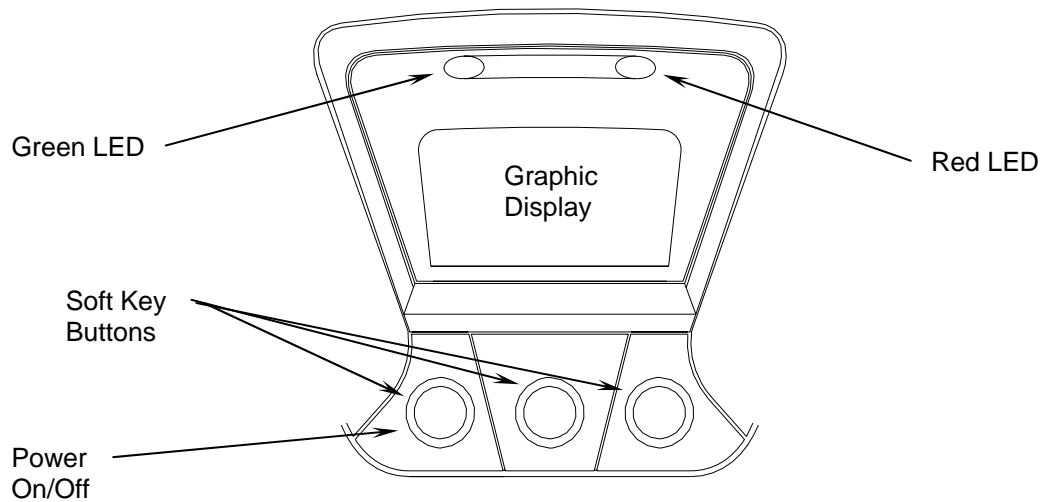


### 1.3.3 AC Power Adapter

The Ultima ID - HVAC is powered via a 110/220 VAC power transformer. This transformer is included with each unit and converts a standard 110/220 wall outlet to 12VDC to power the device. An optional internal and rechargeable battery kit is available separately. Note: Use of any other power source may cause damage to the unit and void the warranty.

### 1.3.4 Control Panel

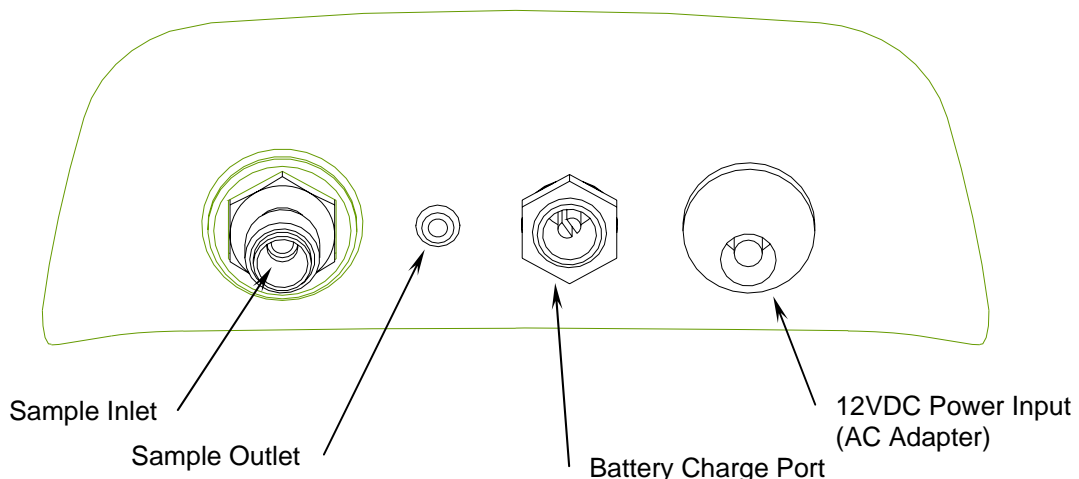
The Control Panel serves as the main user interface. The Control Panel features three soft key buttons that change their function as the instrument changes modes. The current function for each button is displayed by the soft key label at the bottom of the graphic display. Red and Green LED's at the top of the Control Panel are used for visual status indications.



### 1.3.5 Back Panel Connections

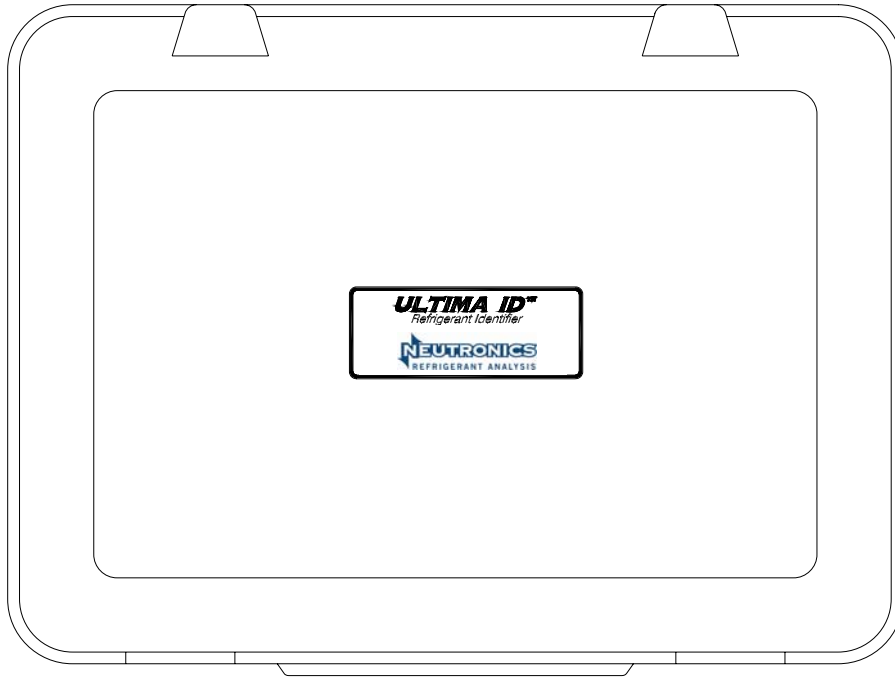
The connections located on the back panel are illustrated below.

**CAUTION:** The sample outlet port should never be obstructed. Keep the sample outlet port free and clear at all times.



### 1.3.6 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.



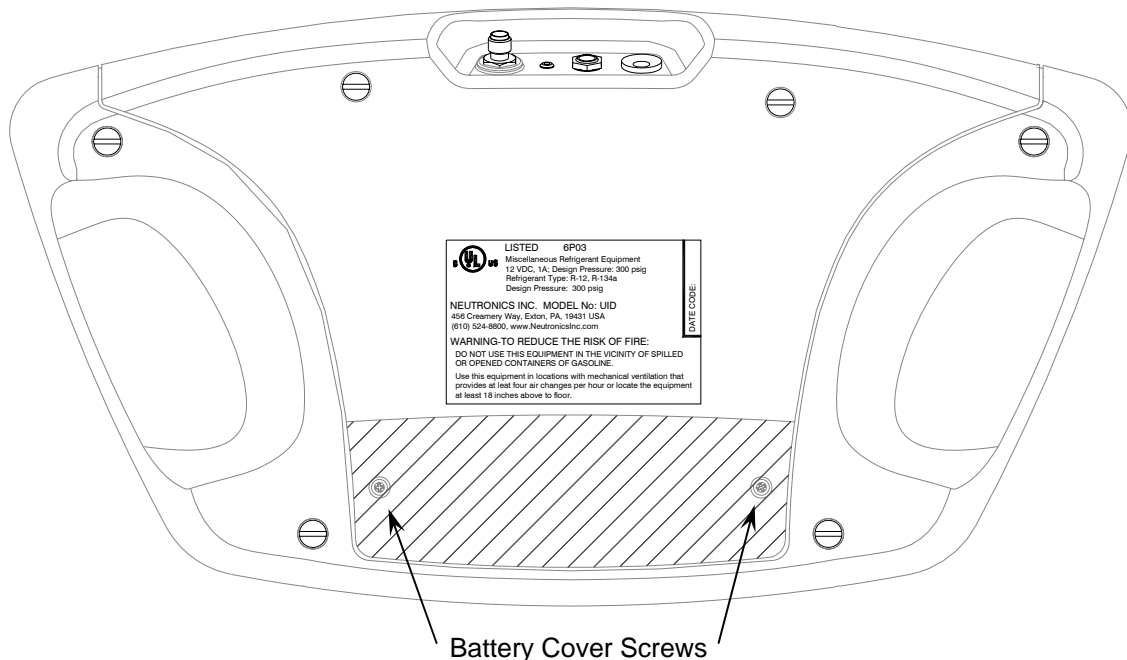
# 2 ULTIMA ID - HVAC OPERATION

## 2.1 First Use

### 2.1.1 Battery Installation (Optional)

The Ultima ID - HVAC has, as an option, an internal rechargeable battery. If your Ultima ID - HVAC is equipped with the optional rechargeable battery, you must first install and charge the battery prior to use. NOTE: The Ultima ID - HVAC can be operated with or without the battery using the supplied AC adapter. Refer to Section 2.2 for instructions.

To install the optional battery, remove the battery cover from the back of the unit by unscrewing the two Phillips head screws as shown below.



Inside of the Ultima ID - HVAC battery compartment, locate the male plug on the left side. Slide the nylon strap around the battery. Insert the battery module into the compartment aligning the female connector of the battery module with the male plug in the battery compartment. Replace the cover and snug the screws.

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

To remove the battery, simply tug gently on the nylon strap, being sure to pull straight up, until the battery is dislodged. The battery may be charged either inside of the unit or independent of the unit.

## 2.2 Turning On the Unit

Connect the included AC power supply to the 12VDC power input jack on the back of the unit. Plug in the AC power supply to a 110VAC or 220VAC outlet. (Note: If the optional battery module is installed and charged, the AC power supply is not required.) Press the left, soft key, power button and the splash screen shown in **Figure 1** will appear for approximately three seconds followed by the elevation screen shown in **Figure 2**. See section 3.1 for details on setting the elevation. Depressing the “DONE” button will bring the Ultima ID - HVAC to the Calibration screen as shown in **Figure 3**.



Figure 1

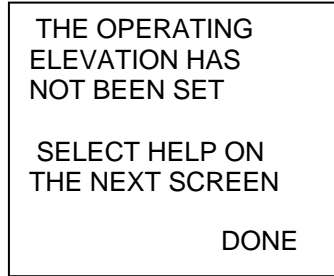


Figure 2

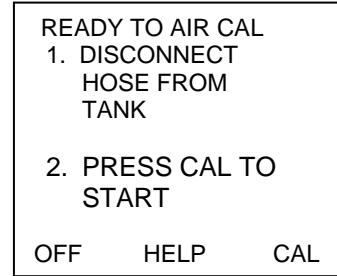


Figure 3

## 2.3 Calibration

Each time the Ultima ID - HVAC begins a new test cycle it must first self calibrate. The calibration takes 30 seconds (**Figure 4**) and brings fresh air into the unit via an internal pump. This fresh air purges any excess refrigerant from the unit and ensures accurate test results. Calibration requires that the hose be disconnected from the refrigerant cylinder or air conditioning system. During calibration, the screen shown in **Figure 5** will appear reminding the user to change the filter under certain conditions. For additional details on how and when to change the filter, refer to Section 3, Maintenance and Troubleshooting. The calibration of the unit will expire after approximately five minutes of inactivity. If this occurs, the screen shown in **Figure 6** will be displayed requiring the calibration to be initiated again.

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

After calibrating, the unit will display the screen shown in **Figure 7**. Connect the hose to the tank and press test. The Ultima ID - HVAC will display the screen shown in **Figure 8**. If you wish to change any of the factory default settings, refer to section 3.

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

Figure 7

TESTING  
SAMPLE  
THIS WILL ONLY  
TAKE 30 SECONDS

Figure 8

## 2.4 Viewing the Test Results

Upon completion of the test, the Ultima ID - HVAC will display a screen similar to that shown in **Figure 9** or **Figure 10**.

RESULTS	
R134a	XX.X
R12	XX.X
R22	XX.X
HC	XX.X
AIR	XX.X
EXIT	PRINT

Figure 9

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

Figure 10

If the refrigerant tested is 90% pure or better, the results will be displayed as shown in **Figure 9**. Should the refrigerant be less than 90% pure the results will be displayed as shown in **Figure 10**.

Note: Air is only displayed for R134a and only when the R134a refrigerant concentration is greater than 90%. "NON" represents non-condensable such as air or another diluting gas.

## 2.5 Blend Refrigerants

The Ultima ID - HVAC includes the “Blend ID” feature for determining the presence of R410a. In the event that the Ultima ID - HVAC determines that the refrigerant in the system or cylinder is likely to be R410a, the results will display as follows in **Figure 11**. Pressing the “MORE” button will display the R410a screen shown in **Figure 12**. If the Blend is not recognized, the screen shown in **Figure 13** will be displayed. Note: Please refer to Appendix 3.9 for a list of known blends and cautions regarding test results.

RESULTS	
DET - 1	XX.X
DET - 2	XX.X
DET - 3	XX.X
DET - 4	XX.X
NON	XX.X
EXIT	MORE PRINT

Figure 11

PROBABLE R410A REFRIGERANT	
EXIT	DONE

Figure 12

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

Figure 13

Pressing the “EXIT” button in **Figure 12** will return the user to the screen shown in **Figure 11**.

## 2.6 Printing the Test Results

For units equipped with the optional built-in printer module, the test results can be printed by selecting the “PRINT” button. After the print is complete, carefully tear off the printout and the unit will return to the previous screen. Additional printouts may be made following the same procedure. To exit the test, press the “EXIT” button. **Figures 14, 15, & 16**, show sample printouts for various test results.

Neutronics Inc. Refrigerant Identifier	
R134a	.0
R12	.0
R22	100.0
HC	.0
_____	
(Date)	
_____	
(Technician)	
_____	

Figure 14

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)	
_____	

Figure 15

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)	
_____	

Figure 16

# 3 MAINTENANCE & TROUBLESHOOTING

## 3.1 Setting the Elevation

During the initial power-up, the Ultima ID - HVAC will indicate that the elevation has not been set. To set the elevation, press the “Help” button on the “Ready to Air Cal” screen as shown in **Section 2.2, Figure 3**. The screen will display several options as shown in **Figure 17**. Pressing the “SET” button will display the options in **Figure 18**.

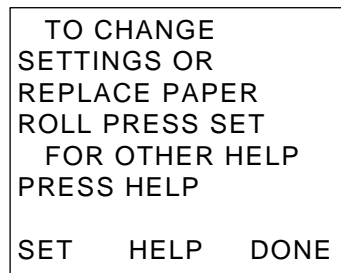


Figure 17

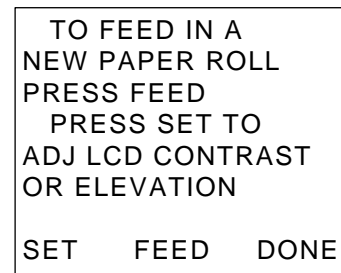


Figure 18

Press the “SET” button shown in **Figure 18** to display the screen options shown in **Figure 19**. Pressing the “ELEV” button will take you the elevation screen shown in **Figure 20**. Use the “UP” & “DOWN” buttons to adjust the unit to the elevation in your area. Press the “SAVE” button when finished to return to the help screen (**Figure 17**).

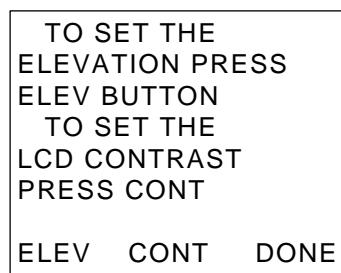


Figure 19

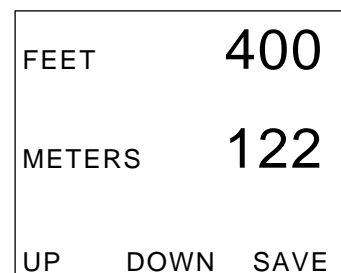


Figure 20

## 3.2 Setting the LCD Contrast

The Ultima ID - HVAC features an adjustable LCD contrast for use in varying light conditions. To adjust the contrast, press the “HELP” button on the “Ready to Air Cal” screen as shown in **Section 2.2, Figure 3**. The screen will display several options as shown in **Figure 17**. Pressing the “SET” button will display the options in **Figure 18**.

```

TO CHANGE
SETTINGS OR
REPLACE PAPER
ROLL PRESS SET
FOR OTHER HELP
PRESS HELP
SET  HELP  DONE

```

Figure 21

```

TO FEED IN A
NEW PAPER ROLL
PRESS FEED
PRESS SET TO
ADJ LCD CONTRAST
OR ELEVATION
SET  FEED  DONE

```

Figure 22

Press the “SET” button shown in **Figure 21** to display the screen options shown in **Figure 22**. Pressing the “SET” button in **Figure 22** will advance the display to **Figure 23**. Pressing the “CONT” button will take you the contrast screen shown in **Figure 24**. Use the “UP” & “DOWN” buttons to adjust the screen contrast for best viewing. Press the “SAVE” button when finished to return to the help screen (**Figure 21**).

```

TO SET THE
ELEVATION PRESS
ELEV BUTTON
TO SET THE
LCD CONTRAST
PRESS CONT
ELEV  CONT  DONE

```

Figure 23

```

ADJUST CONTRAST
FROM 0 TO 80
SETTING 045
UP  DOWN  SAVE

```

Figure 24

### 3.3 Changing the Sample Filter

When inspecting the sample filter, look completely around the entire outside diameter of the white filter element located inside of the clear plastic housing. Look for red spots or the beginnings of discoloration on the white outside diameter of the element. Do not look into the round ends of the white element for red spots or discoloration. The round ends of the filter may always appear red. If red spots or discolorations are discovered, the sample filter requires replacement to prevent the influx of particulate and oil mists into the instrument.

Obtain a replacement filter, part number 6-02-6000-08-0. Remove the existing filter from the retaining clip of the instrument by pulling straight up and out. CAREFULLY remove the flexible, black rubber tubing connections from both ends of the existing filter. DO NOT allow the tubes to slip back into the internal portion of the case. Discard the existing filter in an environmentally friendly manner.

Install the tube ends onto the barbs of the replacement filter, taking note to align the flow arrow of the filter with the flow arrow of the instrument top panel. CAREFULLY slide the tubing back into the internal portion of the instrument and seat the new filter into the retaining clip. Inspect the sample hoses for signs of oil entrapment. Replacement of the sample filter usually requires cleaning or replacement of the sample hoses.

### 3.4 Cleaning the Sample Hoses

Inspect the inside diameter of the inner tube for signs of oil build up, dirt, obstructions, kinks, cuts, fraying, or any other signs of wear. Oil contamination can be cleaned out of sample hoses as directed below. Hoses that show signs of wear should be replaced immediately to avoid dangers of rupture or bursting.

Remove the hose from the instrument and flush with isopropyl alcohol until the oil is thoroughly cleansed from the inner tube.

**Warning:** Flush hoses away from sparks, open flames or other ignition sources and in an area that is well ventilated.

Dry the hose by blowing clean, dry nitrogen or shop air through the inner hose or by allowing the hose to air-dry for several hours. Take care to not dry the hose with shop air that is lubricated. When the hose is completely dry, re-inspect the hose for signs of wear, as described above, and replace if wear is evident.

### 3.5 Changing the Printer Paper

Ultima ID - HVAC refrigerant Identifiers that are equipped with on-board printers use an inexpensive thermal paper for printing. The paper roll should be changed when a red stripe appears on the left side of the printout.

To change the paper roll, press the “HELP” button on the “Ready to Air Cal” screen as shown in **Section 2.2, Figure 3**. The screen will display several options as shown in **Figure 25**. Press the “SET” button to advance to the screen shown in **Figure 26** and then press the “FEED” button.

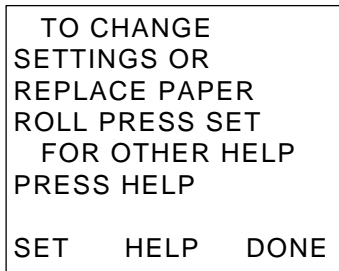


Figure 25

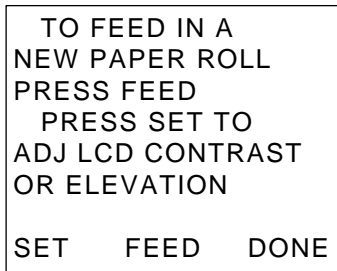


Figure 26

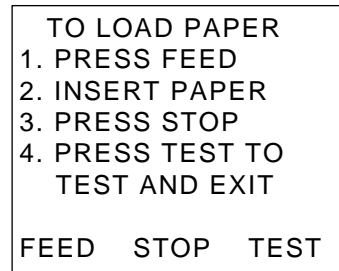
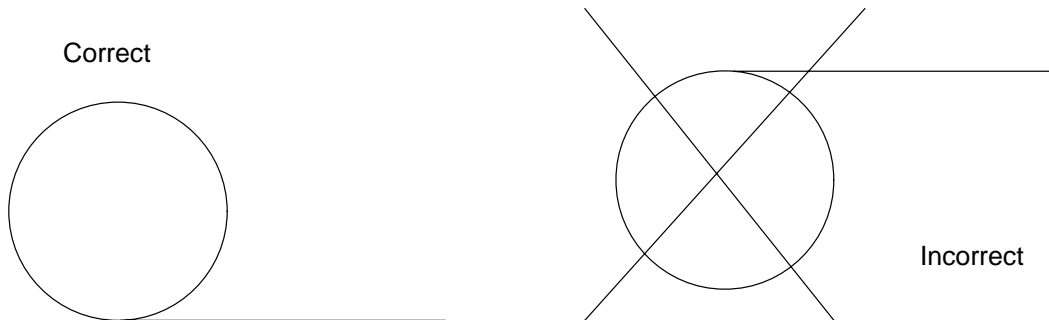


Figure 27

Open the printer door and remove the old roll by tearing the paper as it enters the printer then pressing the “FEED” button shown in **Figure 27** until the old roll exits the printer completely. Insert the new paper roll from the underside as shown below:



Press the “FEED” button shown in **Figure 27** to automatically advance the paper through the printer. When the paper appears on the top of the printer, press the “STOP button. Press the “TEST” button to print a test message and verify that the paper is installed properly. Slide the paper through the slot in the printer door and close the door.

### 3.6 Low Battery Warning

For units equipped with the optional rechargeable battery, a “Low Battery Warning” will appear when the battery is nearly exhausted. Several tests may be run after the initial warning however, it is strongly recommended that the unit be recharged or the external battery clips be used. Allowing the battery to fully discharge may greatly affect its service life.

### 3.7 Error Messages

In the unlikely event that an “Error” message is displayed on the screen, power off the unit, take it to a location outside of the shop environment where fresh air is available and turn the unit back on. If the “Error” message reappears, refer to the help screens on the instrument or contact our service department for assistance.

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 Exton, PA 19341  
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 Fax: 610-524-8807

Fingerprint your own unit! Test virgin samples of various refrigerants and record the results here for future easy reference!

Blend	Det -1	Det -2	Det -3	Det -4	Non
R401A/B					
R402A					
R402B					
R407C					
R408A					
R409A					
R502					

# APPENDICES

## 3.8 Spare Parts List

PART NUMBER	DESCRIPTION
6-02-6000-02-0	¼" Flare Sample Hose
6-02-6000-08-1	Sample Filter (5 Pack)
6-01-6001-13-0	AC Power Supply
6-02-6001-04-1	Battery Kit (Optional)
6-02-6001-04-0	Spare Battery
6-01-6001-10-0	Printer Upgrade (Factory Installation Only)
5-03-1000-08-0	Printer Paper Roll
5-06-7000-69-0	Operating Manual

## 3.9 Appendix B - Specifications

<b>SAMPLE PARAMETERS:</b>	Vapor only, oil-free, 300 psig (2 MPa) Maximum																																																						
<b>DETECTED COMPOUNDS:</b>	R12, R134a, R22, Hydrocarbons, Air																																																						
<b>SENSOR TECHNOLOGY:</b>	Non-Dispersive Infrared (NDIR)																																																						
<b>REFRIGERANT SAMPLE SIZE:</b>	0.3 ounces (8.5 grams) per sample																																																						
<b>POWER:</b>	9 – 15 VDC, 2 Amps Maximum																																																						
<b>OPERATIONAL TEMPERATURE:</b>	40-122°F																																																						
<b>BLEND REFRIGERANTS:</b> <b>CAUTION: THIS UNIT HAS BEEN CALIBRATED TO R410A. SPECIFIC RESULTS SHOWN WILL VARY BY UNIT.</b>  <b>THE CHART SHOWN IS FOR GENERIC REFERENCE ONLY.</b>	Displays R410a. Not Suitable for R404a, R507a as they are presented as R134a. Blend data shown below is for reference only at 70°F and should be verified by the user with virgin refrigerant. <table border="1" data-bbox="690 1396 1437 1780"> <thead> <tr> <th>Blend</th> <th>Det -1</th> <th>Det -2</th> <th>Det -3</th> <th>Det -4</th> <th>Non</th> </tr> </thead> <tbody> <tr> <td>R401A</td> <td>&lt;10</td> <td>&lt;10</td> <td>85-95</td> <td>0</td> <td>0</td> </tr> <tr> <td>R401B</td> <td>&lt;10</td> <td>&lt;10</td> <td>87-97</td> <td>0</td> <td>0</td> </tr> <tr> <td>R402A</td> <td>&lt;10</td> <td>&lt;8</td> <td>75-95</td> <td>&lt;10</td> <td>&lt;20</td> </tr> <tr> <td>R402B</td> <td>&lt;10</td> <td>&lt;6</td> <td>87-97</td> <td>&lt;10</td> <td>&lt;6</td> </tr> <tr> <td>R407C</td> <td>70-90</td> <td>&lt;6</td> <td>&lt;5</td> <td>10 - 25</td> <td>15-35</td> </tr> <tr> <td>R408A</td> <td>45-65</td> <td>0</td> <td>35-55</td> <td>0</td> <td>0</td> </tr> <tr> <td>R409A</td> <td>&lt;10</td> <td>&lt;15</td> <td>75-95</td> <td>0</td> <td>0</td> </tr> <tr> <td>R502</td> <td>50-70</td> <td>0</td> <td>30-50</td> <td>0</td> <td>0</td> </tr> </tbody> </table>	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
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### 3.10 APPENDIX E – Warranty

NEUTRONICS warrants, subject to the terms listed below, that the goods will be free from defects in design, materials, and workmanship for a period of (1) one year from the date that the goods are shipped to the buyer.

**THE SOLE LIABILITY OF NEUTRONICS FOR ALL PURPOSES SHALL BE TO REPAIR OR REPLACE, AT THE SOLE OPTION OF NEUTRONICS, DEFECTS APPEARING WITHIN THE (1) ONE YEAR PERIOD. NEUTRONICS SHALL HAVE NO OBLIGATION FOR REPAIR OR REPLACEMENT UNLESS NEUTRONICS HAS RECEIVED WRITTEN NOTICE OF THE ALLEGED DEFECT WITHIN THE (1) ONE YEAR PERIOD AND THE DEFECTIVE GOODS ARE PROMPTLY RETURNED BY THE BUYER, AT THEIR EXPENSE, TO NEUTRONICS AT: 456 CREAMERY WAY EXTON, PA 19341 USA, AND THE DEFECT OCCURS UNDER THE CIRCUMSTANCES OF PROPER USE IN ACCORDANCE WITH ALL INSTRUCTIONS AND MANUALS PROVIDED TO THE BUYER. NEUTRONICS WILL DELIVER THE REPAIRED OR NEW GOODS TO THE BUYER AT NEUTRONICS EXPENSE. IN NO EVENT WILL NEUTRONICS BE LIABLE FOR ANY LOSS OR DAMAGE DIRECTLY OR INDIRECTLY ARISING FROM THE DEFECTS OR FROM THE USE OF THE GOODS OR FROM CONSEQUENTIAL OR INCIDENTAL DAMAGES, WHETHER IN CONTRACT, TORT, OR OTHERWISE, FOR PERSONAL INJURY OR PROPERTY DAMAGE OR ANY FINANCIAL LOSS.**

Buyer shall be responsible for insuring that the goods are functioning properly at all times and shall not use any goods which are not functioning properly. Buyer, therefore, agrees to indemnify NEUTRONICS from and against all losses and claims to or by any person or property caused in any manner by the goods or the use of the goods, including any expenses and attorney's fees in connection with all claims, demands, proceedings, or other expenses.

Any description of the goods contained in any documents to which these warranty provisions relate, including any quotations or purchase orders relating to the goods being delivered to the buyer, are for the sole purpose of identifying the goods, and any such description, as well as any sample or model which may have been displayed to or seen by the buyer at any time, have not been made part of the basis of the bargain and have not created or amounted to any express warranty that the goods would conform to any such description or any such sample or model.

**NEUTRONICS DOES NOT WARRANT THAT THE GOODS ARE FREE OF THE RIGHTFUL CLAIM OF ANY THIRD PERSON BY THE WAY OF INFRINGEMENT OF PATENT OR OTHER PROPRIETARY INFORMATION AND DISCLAIMS ANY WARRANTY AGAINST SUCH INFRINGEMENT.**

It shall be the responsibility of the buyer to read carefully and abide by all instructions provided to the buyer in the instruction manual or elsewhere. If the buyer, or the employees of the buyer, did not abide by such instructions, then the alleged defect shall not be deemed to have arisen under circumstances of proper use.

The terms of these warranty provisions shall apply to all products sold by Neutronics, except filters which are considered "consumable items," and as such are not covered by the terms of these warranties. No waiver, alteration or modification of the terms of these provisions shall be valid unless in writing and signed by an executive officer of NEUTRONICS.

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