



Mastercool[®] Inc.
"World Class Quality"

ULTIMA ID R1234yf™

AUTOMOTIVE REFRIGERANT ANALYZER OPERATION MANUAL





For Your Safety:

PLEASE READ THIS MANUAL IN ITS ENTIRETY BEFORE ATTEMPTING INSTALLATION OR OPERATION! Attempting to operate the *Ultima ID R1234yf*™ without fully understanding its features and functions may result in unsafe conditions.

Analyzer Warnings

- **REFRIGERANT BLEND WARNING:** Operate this unit with vehicles or cylinders marked to contain R-1234yf or R134a refrigerant. Cross-contamination with other refrigerant types causes severe damage to the A/C system, to service tools, and equipment. Do NOT attempt to adapt the unit for another refrigerant. Do NOT mix refrigerant types in a system or in the same container.
- **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 or inaccurate results.
- **FLAMMABILITY WARNING:** Some vehicles may contain illegal substitute refrigerants that may contain hydrocarbons. R-1234yf is considered a flammable substance. Failure to follow the manual can result in serious injury or death. Less than 2 grams of refrigerant are required to be vented with each sample. This analyzer is designed with sealed heat sources and without sparking components. Ensure adequate ventilation in the recycling machine design to prevent the accumulation of refrigerants.
- **SAMPLE INPUT WARNING:** *DO NOT* attempt to introduce liquid or samples heavily laden with oil into the Low Side sampling hose configuration. Damage caused to the instrument due to the use of the wrong hose configuration on the wrong port will void the warranty!
- **BATTERY CHARGING WARNING:** When charging the internal battery with the supplied power supply, the power supply may become warm. If the power supply becomes warm, unplug the cord immediately! When charging multiple analyzers, allow the charger to cool between each battery.
- **AIR SENSOR WARNING:** The air detection sensor is a chemical fuel cell sensor that will eventually expire. The user must return the unit to replace the air detection sensor whenever the instrument indicates as such. Failure to replace the air detection sensor will result in non- functionality of the instrument.
- **POWER SOURCE WARNING:** Connection to power sources greater than 13VDC could cause “out of warranty” damage.
- **OPPERATIONAL WARNING:** If the equipment is used in a manner not specified by the manufacturer, the protection by the equipment may be impaired.

General Cautions



- **ALWAYS** wear eye and skin protection when working with refrigerants. Escaping refrigerant vapors will present a freezing danger. Do NOT direct refrigerant escaping from the sample hose toward exposed skin or toward the face.
- **ALWAYS** turn the compressor or automobile engine *OFF* before connecting the instrument to an air conditioning system.



- **ALWAYS** inspect the sample hose before each use. Replace the hose if it appears cracked, frayed, obstructed or fouled with oil.
- **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 analyzer on a flat and sturdy surface.
- To reduce the risk of electrical shock, do NOT disassemble the instrument; do not use the instrument in wet or damp areas.
- Some systems may contain hydrocarbons or flammable refrigerants. This analyzer is designed with sealed heat sources and without sparking components. Ensure adequate ventilation and always take proper precautions when working with refrigerants.



- **DO NOT** breathe refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose, and throat. Use recycling equipment certified to meet the requirements of SAE J2788, J2843, or J2851 to remove refrigerant from the A/C system. If accidental system discharge occurs, immediately ventilate the work area. There must be adequate ventilation in the vehicle servicing area.



- **DO NOT** utilize any 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 from the Low Side 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 *500 psig*.
- **NEVER** obstruct the air intake, sample exhaust or case vent ports of the instrument during use.
- **DO NOT** utilize the coupler supplied on the service end of the R134a or R1234yf Sample Hoses for any application other than with the instrument. The coupler supplied is a modified version that does not contain a check valve and is not suitable for any other refrigerant application.

1

INTRODUCTION AND OVERVIEW

1.1 General

Contamination of refrigerants either in storage cylinders or vehicle 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 vehicle air conditioning system.

The *Ultima ID R1234yf™* Refrigerant Analyzer will provide a fast, easy and accurate means to determine refrigerant purity in refrigerant storage cylinders or directly in vehicle air conditioning systems. The instrument utilizes non-dispersive infrared (NDIR) technology to determine the weight concentration of R1234yf or R134a refrigerant. Acceptable refrigerant purity as it relates to this instrument, has been defined by the SAE as a refrigerant mixture that contains 98.0%, or greater of R1234yf or R134a, by weight.

The instrument is supplied complete with an R1234yf sample hose, an R134a sample hose, a 100-240 VAC power transformer, built in Lithium Iron Phosphate battery, thermal printer 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 a digital display of refrigerant purity. The instrument only considers the weights of the refrigerant and contaminants in the total mixture. Air is measured, and displayed, separately. Other contents such as refrigerant oil and dye are not considered contaminants.

The instrument interfaces with the user via a LCD graphic display, status indicator lamps, and push button communication switches. Alarm indications are provided to alert of instrument fault conditions or contaminated refrigerant presence.

1.2 Features

The *Ultima ID R1234yf*[™] Refrigerant Analyzer is the most precise handheld instrument ever manufactured for determining the purity of R1234yf and R134a for the automotive market.

Features Include:

- Advanced ergonomic design
- Fender friendly resting surface
- Large graphic display with on-screen instructions
- Ultra-fast 70 second test time
- Internal, rechargeable Lithium Iron Phosphate battery for cordless operation in any location
- USB Port for connection to the AC Service Machine & remote software updates
- Hard shell carry/storage case
- Built in Printer

1.3 Ultima ID R1234yf™ Components

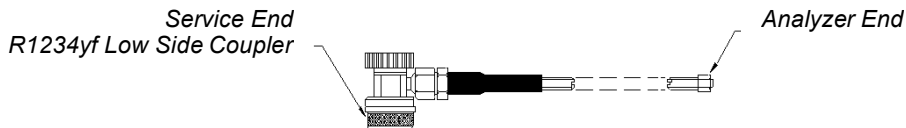
Ultima ID R1234yf Base Unit

The *Ultima ID R1234yf™* base unit houses the Graphic Display, Infrared Bench, Electrical Connections, and Rechargeable Battery. These components require no maintenance, therefore **there are no serviceable components internal to the instrument, and disassembly will void the warranty.**



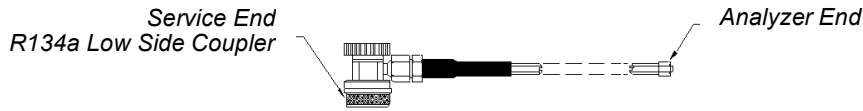
R1234yf Sample Hose

The 6.5 foot (2 meter) R1234yf Sample Hose is constructed of polyurethane ether. The hose is provided with an instrument inlet port mating connector on one end and a Brass Sample Hose Restrictor on the other end that screws into the R1234yf Low Side Coupler. The sample hose is considered a consumable maintenance part. A spare Brass Sample Hose Restrictor is also provided.



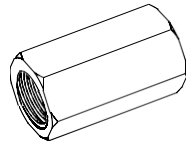
R134a Sample Hose

The 6.5 foot (2 meter) R134a Sample Hose is constructed of polyurethane ether. The hose is provided with an instrument inlet port mating connector on one end and a Brass Sample Hose Restrictor on the other end that screws into the R134a Low Side Coupler. The sample hose is considered a consumable maintenance part. A spare Brass Sample Hose Restrictor is also provided.



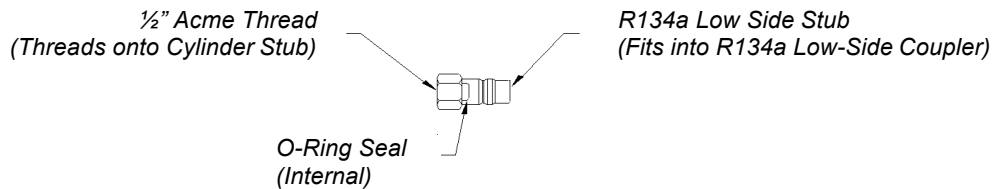
R1234yf Tank Adapter Fitting

The R1234yf Tank Adapter Fitting will provide the user with an adapter to allow connection of the M12 Flow Restrictor to the 1/2" LH Acme threads on the R1234yf cylinder.



R134a Tank Adapter Fitting

The R134a Tank Adapter Fitting will provide the user with an adapter to allow connection of the R134a sample hose service end to an R134a cylinder ACME port.



AC Power Adapter

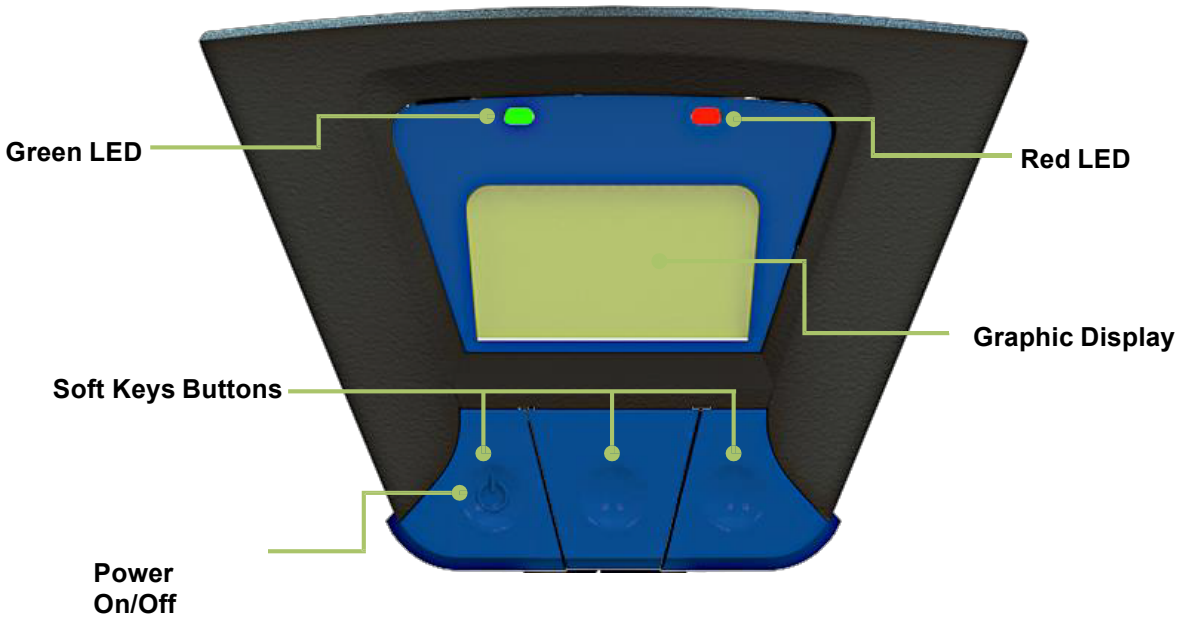
The *Ultima ID R1234yf*™ is powered via a Lithium Iron Phosphate battery. You can also power the unit via the 90-264 VAC, 50-60 Hz power transformer. This transformer is included with each unit and converts a standard 100-240VAC 50/60Hz wall outlet to 12VDC, 2.0A, which powers the device. This AC Power Adapter will also charge the battery when connected to the analyzer.

NOTE: Use of any other power source may cause damage to the unit and void the warranty.



Control Panel

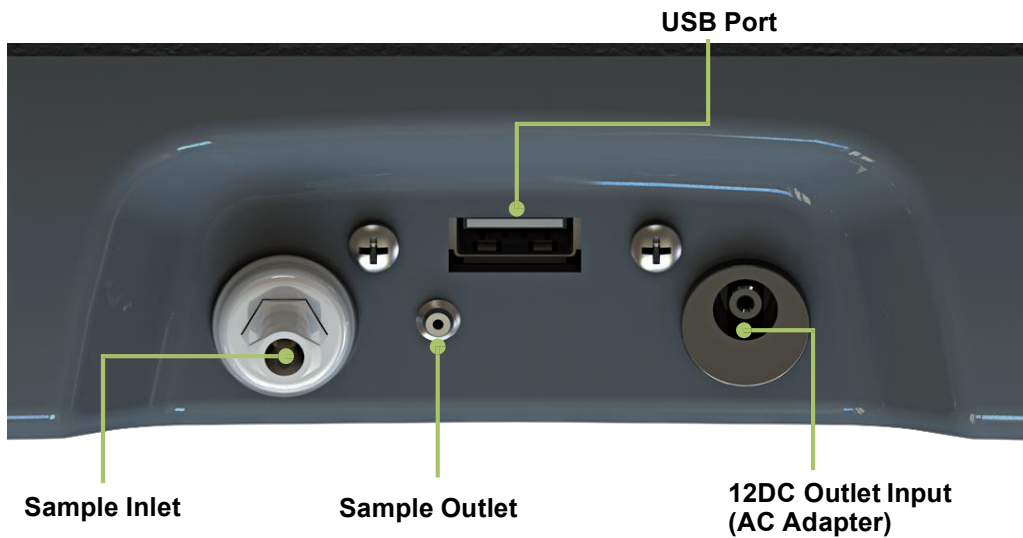
The Control Panel serves as the main user interface. The Control Panel features three soft key buttons that change their function as the instrument changes modes. The current function for each button is displayed above the Soft Key Buttons on the LCD graphic display. Red and Green LED's at the top of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



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. Do not operate near open flame.



2 ULTIMA ID R1234YF OPERATION

2.1 First Use

The *Ultima ID R1234yf*[™] has a built in Lithium Iron Phosphate battery. Prior to first use charge the battery for a minimum of 2 hours with the included AC Power Supply. If a power outlet is accessible you may also use the AC Power Supply to power the unit. The analyzer will function and charge the battery when the AC Power Supply is connected.

2.2 Turning On the Unit

For use with an SAE J2843 certified AC Service Machine, connect one end of the provided USB cable to the USB port on the back of the analyzer and connect the other end of the USB cable to the R1234yf AC Service Machine. If the unit is used as an independent device or for testing of R134a systems, the USB cable need not be connected.

Press the left, soft key, 'POWER' button and the splash screen shown in **(Figure 1)** will appear. After selecting 'OK', the warm up screen shown in **(Figure 2)** will appear for 30 seconds. Once the analyzer warms up you are ready to select the refrigerant you are going to test **(Figure 3)**. If you wish to adjust factory settings press 'HELP' and refer to section **3 Maintenance & Troubleshooting**.



Figure 1



Figure 2



Figure 3

2.3 Calibration

Each time the *Ultima ID R1234yf*TM begins a new test cycle it must first self-calibrate. The calibration takes 30 seconds and pulls 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 **MUST** be connected to the device and disconnected from the vehicle or refrigerant cylinder.

Select the refrigerant to be tested as shown in (Figure 3). Follow the on screen instructions shown in (Figure 4) and then press the 'CALIBRATE' button. This will begin the calibration process and display the screens shown in (Figure 5) followed by (Figure 6).



Figure 4

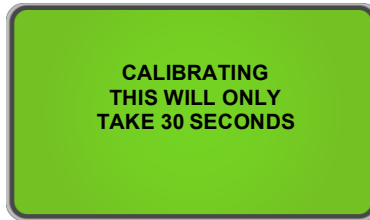


Figure 5

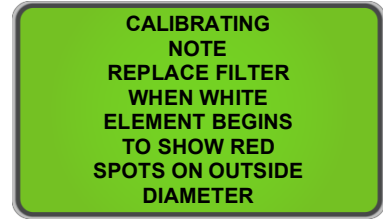


Figure 6

2.4 Testing the Refrigerant

After the self-calibration is complete, the instrument is ready for testing the refrigerant and will display the screen shown in (Figure 7). Connect the hose to the vehicles low side Schrader valve or open the valve on the cylinder. Allow the refrigerant to flow and then press the 'OK' button to begin the test. The screen shown in (Figure 8) will be displayed.

NOTE: The screen shown in (Figure 9) will be displayed if any of the following conditions exist. Press 'OK' once you have confirmed or denied the following conditions.

- The device is not connected to a refrigerant source.
- The coupler valve is not open.
- The Brass Flow Restrictor is clogged with oil or debris.
- The source contains little or no refrigerant.

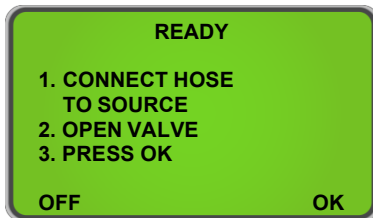


Figure 7

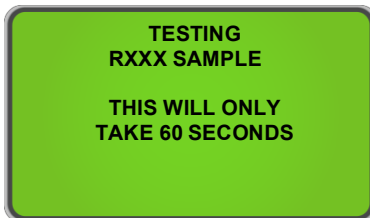


Figure 8

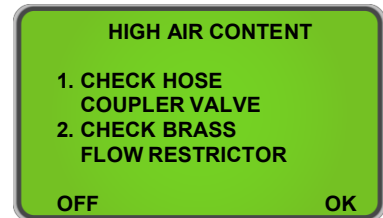


Figure 9

2.5 Viewing the Test Results

Upon completion of the test, the *Ultima ID R1234yf™* will display a screen similar to that shown in **(Figure 10)** or **(Figure 11)**. Select 'OFF' to power down the device, 'PRINT' to print the results (*Model RI-2012yfp*) or 'OK' to return to the Select Refrigerant screen shown in **(Figure 3)**.

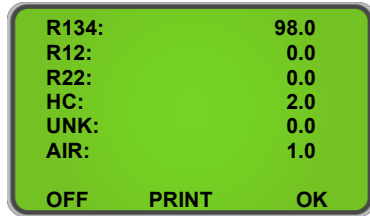


Figure 10

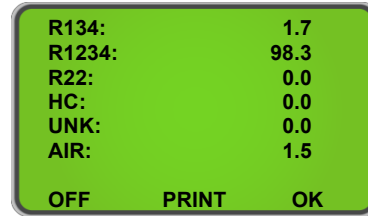


Figure 11

If the refrigerant tested is 98.0% pure or better, the refrigerant is deemed suitable for standard recovery and reuse. Should the refrigerant be less than 98.0% pure, the refrigerant is not suitable for standard recovery and should not be reused. In either case, disconnect the hose from the vehicle and press either 'OK' to return to the Select Refrigerant screen or 'OFF' to turn the instrument off.

3 MAINTENANCE & TROUBLESHOOTING

3.1 Changing the White Plastic 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 on the outside diameter, the sample filter requires replacement to prevent the influx of particulate and oil mists into the instrument.

To change the Sample Filter, first 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 on the analyzers top panel. *CAREFULLY* slide the tubing back into the internal portion of the instrument and seat the new filter into the retaining clip. Inspect your hose assemblies for signs of oil entrapment. Replacement of the Sample Filter usually requires replacement of the Brass Sample Hose Restrictor Assembly.

3.2 Replacing the Brass Sample Hose Restrictor

Always inspect the inside diameter of the Sample Hose tube for signs of oil build up, dirt, obstructions, kinks, cuts, fraying, or any other signs of wear before use. Oil contamination cannot be cleaned out of sample hoses due to the density of the brass oil restrictor. If oil is visible in the hose assembly, replace the Brass Sample Hose Restrictor Assembly with either the M12 flow restrictor P/N 6-02-6001-18-4 for the R1234yf Hose or with the M14 flow restrictor P/N 6-02-6001-32-0 for the R134a Hose.

NOTE: The analyzer will indicate “Non-Condensable” or “Unknown Refrigerant” if the analyzer does not receive a good sample due to obstructed flow or lack of flow (approximately less than 30 psig or 2 Bar). If this occurs the Brass Sample Hose Restrictor may need to be replaced.

To replace the Restrictor Assembly, follow the instructions below:

- 1) Disconnect the sample hose from the Analyzer
- 2) Remove the brass restrictor (with hose attached) from the coupler and discard. Be sure to use a backing wrench as not to damage the coupler.
- 3) Check for signs of oil and debris in the coupler.
- 4) Using “CRC Brakleen” or similar cleaner which ONLY contains, Tetrachloroethylene and carbon dioxide, follow safety instructions on the can and spray all parts of the coupler with the cleaner to remove the oil. DO NOT soak the parts for more than 60 seconds.
- 5) Allow coupler parts to dry. Check coupler parts for oil once again. Failure to clean the oil out of the coupler will result in premature clogging of the new filter.
- 6) Install the Brass Sample Hose Restrictor into the coupler and lightly tighten, usually finger tight is sufficient.

3.3 Low Battery Warning

A ‘Low Bat’ indication will appear on the upper right of the screen if the internal battery voltage falls below an acceptable level. The device should then be connected to AC power using the included power supply to recharge the battery.

3.4 Software Updates

From time to time, software updates may be made available to improve operating performance or add additional features. Some updates will be provided at no charge to implement operating efficiencies while others will be optional, paid upgrades, to add new refrigerants etc. Many of the updates can be completed by the user; however some will require the instrument to be returned to the factory for new gas calibrations.

The *Ultima ID Pro*[™] has a USB update port located on the Back Panel Connections. This port should not be used for any other purpose other than to install factory updates using the factory USB drive. **IF YOU DO NOT REGISTER THE ANALYZER WE WILL NOT BE ABLE TO INFORM YOU OF ANY SOFTWARE UPDATES!**

3.5 Air Sensor Low

In the event you receive an 'Air Sensor Low' message there is no need to discontinue use. This message is meant to alert you that the built in oxygen sensor is depleting and will need to be replaced in the near future. If the analyzer you are using is new and you believe you received this message in fault, first verify gas is not flowing into the analyzer and that you are in a well ventilated area. Once you have verified both retry operation. The oxygen sensor is a consumable part and will eventually need to be replaced.

3.6 Help Button

Pressing the 'HELP' button as shown in (Figure 12) will provide access to various device settings as shown in (Figure 13).

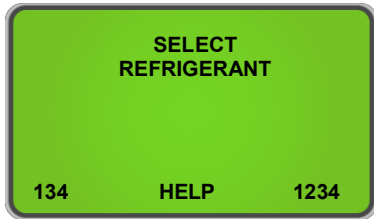


Figure 12

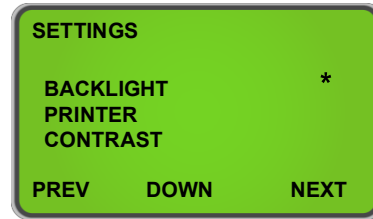


Figure 13

Using the middle 'DOWN' button, scroll to the desired setting you wish to change. Use the right button to select the setting and the left button to return to the previous screen.

- BACKLIGHT will allow the backlight to be turned on or off when the device is running on battery power.
- PRINTER will allow paper to be fed into the printer when replacing a printer paper roll.
- CONTRAST will allow the screen brightness to be adjusted.

When the user is finished making adjustments, press the 'PREV' button to return to the Select Refrigerant screen shown in (Figure 3).

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, contact our service department for assistance.

4.1 Spare Parts List

PART NUMBER	DESCRIPTION
6-02-6001-18-4	M12 Flow Restrictor w/hose for R1234yf Coupler
6-02-6001-32-0	M14 Flow Restrictor w/hose for R134a Coupler
2-02-5100-29-2	R1234yf Tank Adapter
4-03-5004-07-0	R134a Tank Adapter
6-02-6000-08-0	Sample Filter
6-01-6001-13-0	AC Power Supply
5-06-7000-73-0	Operating Manual
5-03-1000-08-0	Printer Paper Roll

4.2 Specifications

SAMPLE PARAMETERS:	Vapor only, oil-free, 300 psig (2 MPa) Maximum
DETECTED COMPOUNDS:	R134a, R1234yf, R12, R22, HC, Unknown, Air
SENSOR TECHNOLOGY:	Non-Dispersive Infrared (NDIR)
REFRIGERANT SAMPLE SIZE:	2 grams per sample
POWER:	Power Supply: Input: 90-264VAC, 50-60HZ Output: 12 VDC, 2.0 AMP Built in Lithium Iron Phosphate Battery: LiFE 2100mAh
OPERATIONAL TEMPERATURE:	50-120°F (10-49°C)