Model ESG4000A

Electronic Sightglass

Tests the State of Refrigerant in Mobile and Stationary AC Systems

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User Manual

CE

US Patent 12,123,850

Made in USA

INTRODUCTION

The TPST model ESG4000A-G Electronic Sightglass gives the AC service technician a real time, non-invasive look inside a refrigerant system. As a troubleshooting tool, the GOSS MODEL ESG4000A can reveal problems that cannot be isolated in any other way - not even with an actual sight glass.

The ESG4000A responds and displays virtually in sync with an actual sight glass as refrigerant changes state from liquid- to a liquid/gas mixture- to a gas. By utilizing a graphic LCD display the TPST MODEL ESG4000A displays a cross section of the refrigerant tubing with animated circles (simulating bubbles) continually sweeping horizontally across the screen through the tubing- similar to an actual sight glass.

The ESG4000A is a valuable tool to the professional AC technician for both preventive maintenance and for quickly solving difficult servicing problems.

FEATURES

- **Optimizes refrigerant charge for maximum cooling**
- **Isolates defective AC components**
- **Aids in adjusting TXV valves**
- **Isolates clogged accumulator/receiver dryer**
- **Checks for refrigerant flood back**
- **Detects starved evaporators**
- **Maximizes evaporator capacity**
- **Eliminates the need for an optical sight glass**
- **Operates on any metal tubing**
- **Operates through use of ultrasonic technology**
- **Includes a rugged carrying case**
- **Four foot Transducer Sensor cables**
- **Two year warranty**
- **Made in USA**

TYPES OF AC SYSTEMS

- **Household and commercial central air conditioners**
- **Household and commercial refrigerators and freezers**
- **Package systems-window air conditioners, room units**
- **Remote and/or split systems**
- **Mini Split AC Systems**
- **All automotive AC Systems**
- **All AC heat pump systems**
- **Automotive EV (electric vehicle) heat pump systems**

Model ESG400A

Color Graphic LCD display shows animated "bubbles" inside refrigerant tubing

Mode Switch changes display to graphic mode

2 Ultrasonic Transducers with 4 foot cable clamp onto refrigerant line

SPECIFICATIONS

Operating Temp Range:	32F to 125F: 0 to 52C
Power Supply Voltage:	4 AA Alkaline Batteries
Display	1.8" Color Graphic LCD
Response Time:	Instantaneous
Tubing Diameter Size	1/8" to 1.25"
Battery Life (continuos)	Approx. 15 hours
Product Size	5.5" x 2.75" x 1.75"
Weight	1.0 lb
Warranty	2 years

NOTE: The ESG4000A is intended to be used by trained professional AC technicians and should not be used as a substitute for a scale when charging an AC system.

OPERATING INSTRUCTIONS: MOBILE AND STATIONARY (NON-MOBILE) A/C SYSTEMS

1. **CONNECT THE TRANSDUCER CLAMPS: With BOTH the ESG4000A and the AC system OFF, connect the transducer clamps to the A/C tubing (metal only) at the desired location (See Figures on page 5 for examples) and tighten the clamp screws hand-tight. Clamps should be mounted firmly and not loose. Clamps can be mounted close together but the space between the clamps should be no more than 1.25 inches apart.**

2. **PRESS THE POWER ON BUTTON: Display will turn on.**

3. **Follow display prompt with the message: "TURN AC ON. SET FAN TO MAX (OPEN DOORS AUTO AC SYSTEMS). Set AC to lowest temperature to ensure AC compressor is engaging.**

4. **PROCESSING: The display will show "PROCESSING" for a short period once the AC Compressor starts*. See Note 1 below.**

5. **DETECTION: Detection begins immediately displaying the state of refrigerant inside the A/C tubing. If bubbles are detected in the liquid refrigerant, the display will show circles on the display (representing bubbles) scanning left to right as the refrigerant cycles through the A/C system. The greater the number of circles, the greater the number of bubbles detected passing though the tubing. If no bubbles are detected, the display will show no circles scanning across the screen. See images below for examples:**

REFRIGERANT STATE

REFRIGERANT STATE

REFRIGERANT STATE

Note 1: Tester will not continue to DETECTION if compressor does not start due to a defect or refrigerant charge is too low. If compressor starts and the Tester does not begin "Processing", press the MODE Switch to continue.

It is normal for liquid refrigerant leaving the condenser to contain some gas or vapor initially until the A/C system and compressor has been running for at least several minutes. Final determination of the state of refrigerant in the A/C system should not be made until the system has been running for a while and is allowed to stabilize.

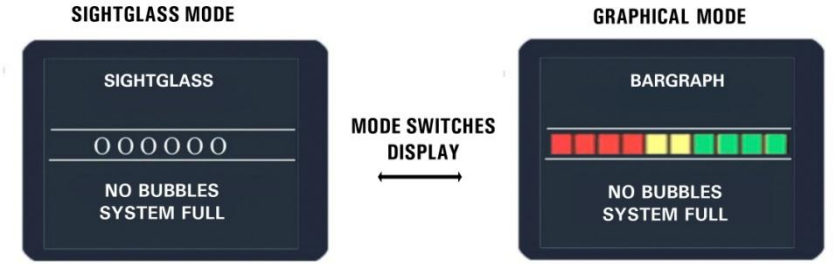
⚠ **CAUTION:** ***Do not add refrigerant without measuring the high side pressure. Serious injury can result if pressure becomes excessive due to mechanical defect.***

MESSAGES

MESSAGE	COMMENT
*NO BUBBLES SYSTEM FULL	"SYSTEM FULL" LINE DISPLAYS ONLY AFTER 4 CONTINUOUS SCREENS NO BUBBLES
BUBBLE RATE LOW SYS PARTIAL FULL OR DEF COMPONENT	SYS PARTIAL FULL DISPLAYS ONLY AFTER 4 CONTINUOUS SCREENS OF "LOW RATE" BUBBLES
BUBBLE RATE HIGH SYSTEM LOW OR DEF COMPONENT	SYS LOW DISPLAYS ONLY AFTER 4 CONTINUOUS SCREENS OF "HIGH RATE" BUBBLES

****Note; this same message may be displayed if the AC system is essentially empty. In that case, the A/C system should be shut off immediately to avoid damage to the compressor or other A/C components.***

MODE SWITCH



In Bar-graph Mode, bubbles in the liquid line are displayed as a graphical representation of the system's state of refrigerant charge as shown below, provided there is no mechanical defect:

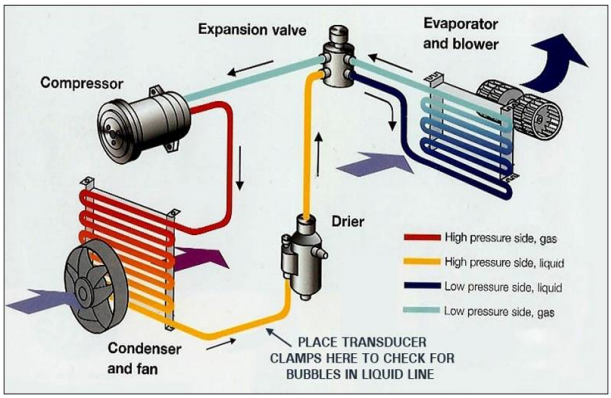
Green Bars Showing	System Full
Yellow Bars Showing	System Partial
Red Bars Showing	System Low

TROUBLESHOOTING TIPS FOR AC SYSTEMS

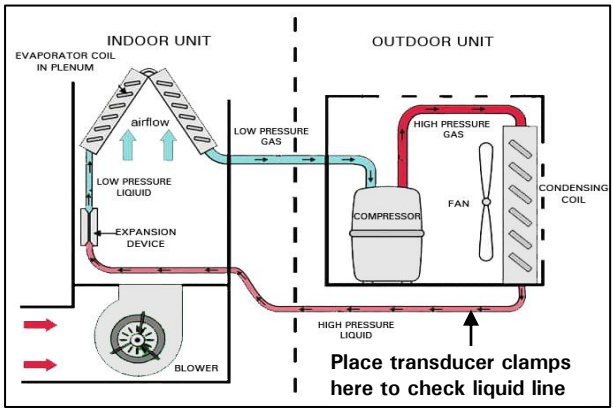
Most faulty AC systems can be diagnosed by first checking to ensure there are no bubbles in the high side liquid line exiting the condenser as shown in the diagrams below. If bubbles are detected, it is likely the refrigerant charge is low or the condensing unit may be defective.

If there are no bubbles exiting the condenser, relocate the transducers to ensure there are no bubbles as the refrigerant exits the accumulator (or receiver dryer) and/or the expansion valve, thereby ensuring there is only liquid at the entrance of the evaporator. Further testing at the exit of the evaporator (suction line) to check for a high rate of bubbles can ensure only gas is entering the compressor to prevent slugging.

TYPICAL AC SYSTEM COMPONENTS



TYPICAL STATIONARY SPLIT AC SYSTEM



REPLACE BATTERIES

This message is displayed when the battery voltage is too low for the circuit to function properly. Replace the 4 AA Alkaline batteries before resuming testing. Battery life should be approximately 10 hours of continuous use.

AUTO SHUTOFF

The ESG4000A will automatically shut off to save battery life after 10 minutes of non-use once the display shows "System Full

TROUBLESHOOTING and PREVENTATIVE MANTENENCE

- **Check for the presence of bubbles in the liquid line just as it leaves the condensing unit, in order to show whether there is air (and other contaminants) in the system.**
- **Check for the presence of bubbles in the liquid line just as it leaves the condensing unit, in order to show whether the system is close to the proper charge.**
- **Check for the presence of bubbles in the liquid line just as it leaves the liquid-line filter-drier, in order to show whether the filter is clogged and needs to be replaced.**
- **Check for the presence of bubbles in the liquid line just as it enters the evaporator, in order to show whether there is too much lift to the line or if it is undersized.**
- **Check for the presence of bubbles in the liquid line just as it enters the evaporator, in order to show whether too much heat is being added to the line.**
- **Check for the presence of liquid droplets in the suction line at the condensing unit, in order to show whether the system is overcharged or if the thermostatic expansion valve is improperly adjusted, or has failed.**
- **Check for the presence of liquid droplets both before and after a suction line filter-drier, in order to show whether it is clogged and needs to be removed or replaced.**
- **Check for the presence of liquid droplets or bubbles in the suction line at the condensing unit, to indicate a condition of too much oil in the compressor or the use of mixed refrigerants.**
- **Check for refrigerant flood-back.**

RETURN FOR REPAIR POLICY

Every effort has been made to provide reliable, superior quality products. However, in the event your instrument requires repair, forward unit to Service Center freight prepaid to the address below with return address, phone number and/or email address.

SERVICE CENTER
2651 West 81st Street
Hialeah, Fl 33016

WARRANTY POLICY

The ESg4000A Electronic Sightglass is warranted to be free of defects in materials and workmanship for a period of two years from the date of purchase. This warranty applies to all repairable instruments that have not been tampered with or damaged through improper use including unauthorized opening of the unit. Please ship warranty units that require repair freight prepaid to Service Center along with proof of purchase, return address, phone number and/or email address.

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