



DIGITAL REFRIGERANT LEAK DETECTOR WITH PUMP

USER'S MANUAL



RLD400

Please read this manual carefully and thoroughly before using this product.

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INTRODUCTION

Thank you for purchasing General Tools & Instruments’ (General’s) RLD400 Digital Refrigerant Leak Detector with Pump. Please read this user’s manual carefully and thoroughly before using the product.

The RLD400’s long-lasting solid electrolyte semiconductor sensor can detect leaks of all halogenated (chlorine or fluorine-based) refrigerant gases currently in common use. They include HFCs (hydrofluorocarbons), CFCs (chlorofluorocarbons) and HCFCs (hydrochlorofluorocarbons).

Specifically, the instrument can detect:

- Widely used HFC refrigerants such as R-134a, R-410a, R-404a, R-407c and R-507
- CFC refrigerants such as CFC-12 (R-12)—commonly known as Freon
- HCFC replacement blends, such as R-22, approved by the U.S. EPA for complying with the stratospheric ozone protection provisions of the Clean Air Act
- R-1234yf, the newly approved hydrofluoroolefin (HFO) refrigerant with a global warming potential 335 times less than that of R-134a

Electronic sensing is the most widely used, sensitive and accurate method of refrigerant leak detection.

WHY LOOK FOR REFRIGERANT LEAKS?

There are three reasons to detect and repair leaks of refrigerant gases from stationary and mobile air conditioners, refrigeration systems and heat pumps:

- 1. Leaks allow air and moisture to enter an A/C system or chiller. Moisture can react with refrigerant to form corrosive acids and sludge that can damage a compressor, plug up orifice tubes, and/or eat pinholes in evaporators and condensers.*
- 2. Refrigerant is expensive. It may seem cheaper to keep recharging your system with refrigerant than fix a leak—but it isn't in the long run. And A/C systems and chillers that aren't fully charged won't cool efficiently and thus waste money (electricity-powered systems) or fuel (vehicle systems).*
- 3. Most refrigerants deplete the ozone layer that blocks the Sun's harmful ultraviolet radiation. In the U.S., the Clean Air Act of 1990 and later amendments require owners or operators of refrigeration and air-conditioning equipment with refrigerant charges greater than 50 pounds to repair leaks within 30 days when those leaks result in the loss of more than 15% (comfort cooling) or 35% (commercial cooling) of the charge over a 12-month period.*

The RLD400's proprietary sensor and detection technology are the keys to its excellent performance and durability. Compared to products of decades past with "heated sensors", the RLD400 warms its sensor to a much lower temperature. The reduction in heat reduces the instrument's power consumption and improves sensor stability while extending the life of the sensor and maintaining its electrochemical function.

Test data indicate no decline in the sensor's performance after thousands of hours of operation. Sensor life is specified at more than ten years of normal use. In addition, because the instrument and sensor comply with SAE Standards J2791 and J2913 and the European Standard EN14624, the sensor will not be damaged by overexposure to refrigerant gas or by contamination by water. To comply with SAE J2791, the RLD400 also had to demonstrate its sensitivity to 15 different chemicals and pass two "garage durability" tests, one requiring it to survive three drops from 4 ft. onto concrete.

HOW IT WORKS

A small mechanical pump inside the RLD400 draws a sample of air through the tip of the instrument's 17-in. long probe into a proprietary sensor 1-1/2 inches downstream. A proportional halogen detector in the sensor determines whether any refrigerant gas is in the sample. If any gas is detected, the sensor and other circuits measure the amount of refrigerant and convert the value to an electrical signal.

If no leak is detected, no signal is produced and the display remains off (dark). When a leak is detected, the signal is amplified, digitized, and displayed on the front panel as a large, bright red number from 1 to 9 corresponding to the size of the leak (1 for the smallest leaks, 9 for the largest).

The digital readout makes it easy to pinpoint the source of a leak and helps you decide whether it is large enough to be worth plugging. The reading is independent of the selected sensitivity level (three are available) and is at its highest when the tip of the probe is at the source of the leak. A table in the Operating Instructions section of this manual correlates display readings with leak size, in ounces per year.

The RLD400 simultaneously uses sound to help locate the source of a leak. Whenever the unit is on, it continuously produces three very loud beeps every two seconds. When a leak is detected, the frequency of the beeping increases dramatically. The beeper can be muted by pressing a dedicated button on the front panel.

A third feature of the RLD400 that helps locate leaks is a red LED adjacent to the sensor at the end of the probe. This light flashes in sync with the beep. In other words, it flashes three times every two seconds whenever the unit is on, and much faster whenever the unit detects refrigerant. When the red LED begins to flash rapidly, your eye will naturally be drawn to it—and therefore the location of the leak. Like the leak-size readout, the LED at the end of the probe is bright enough to be visible in full sunlight.

The RLD400 automatically compensates for ambient levels of refrigerant gas. No manual sensitivity adjustments or power adjustments are required.

The instrument is supplied with a proprietary leak test vial that lets you verify that it is working properly prior to searching for a leak. The RLD400 is powered by four “AA” batteries, which are included in the case.

KEY FEATURES

- Proprietary sensor with lifetime of thousands of hours of operation (ten years of normal use)
- Detects all commercially available HFC, HFO, HC, HCFC and CFC refrigerants as well as blends and newly approved replacements such as R-22 and R-1234yf
- Triple-redundant leak indication (loud fast beep, bright flashing LED, digital leak size reading)
- True mechanical pump draws in samples, increasing sensitivity
- Sensitivity of 0.05 oz./year (1.4 g/year) to R-134a
- Three sensitivity levels
- Fast warmup
- Automatic calibration and reset to ambient levels
- Garage-durable construction
- Low battery indicator
- Made in U.S.A.
- 2-year warranty includes sensor
- Complies with European standard EN 14624
- Comfortable neoprene grip
- Muteable beeper
- Leak test vial
- Padded hard plastic case
- SAE J2791 and J2913 certified
- CE, RoHS, WEEE approved

WHAT'S IN THE CASE

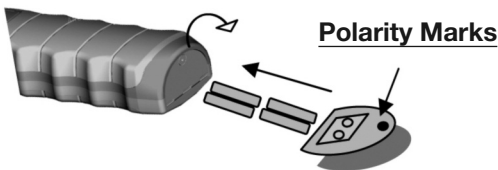
The RLD400 comes fully assembled in a padded hard plastic carrying case. Also in the case are a leak test vial (for checking that the unit is performing properly), a pack of four “AA” batteries, five spare sensor filters and this user’s manual.

SETUP INSTRUCTIONS

INSTALL BATTERIES

To install the four included “AA” batteries, use a Phillips-head screwdriver to open the hinged door of the two-sided battery compartment at the bottom of the RLD400. Insert two batteries in the right side of the compartment (+) end first,

and the other two in the left compartment (-) end first. To help you do this correctly, there are (+) and (-) polarity marks on the hinged door (see figure at right). Be sure each mark ends up next to the corresponding terminal of a battery.



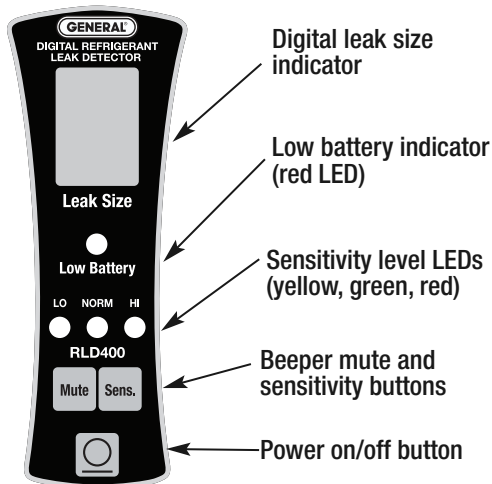
OPERATING INSTRUCTIONS

All of the RLD400’s controls and indicators are on the front panel. Familiarize yourself with the names and positions of the controls and indicators shown below before moving on to the Setup Instructions and Operating Instructions.

STARTING UP

Before the RLD400 can be used to detect refrigerant leaks, it must execute the following three-step startup sequence:

- 1) **TURN ON.** Press the  button to power on the unit.
- 2) **WARM UP.** Once the unit has been powered on, it will automatically begin heating the sensor. During warmup, 1) the digital leak size indicator flashes “0”; 2) the yellow, red and green sensitivity LEDs illuminate in sequence; and 3) the beeper sounds repeatedly at a rate of three beeps every two seconds. To silence the beep, press the **Mute** button. The warmup cycle normally takes 17–20 seconds.
- 3) **READY.** The RLD400 is ready to search for leaks when: 1) the display stops flashing “0” and goes dark; 2) the green **LED** indicating **NORM** sensitivity (the default level) lights up; and 3) you hear and feel the internal pump start up.

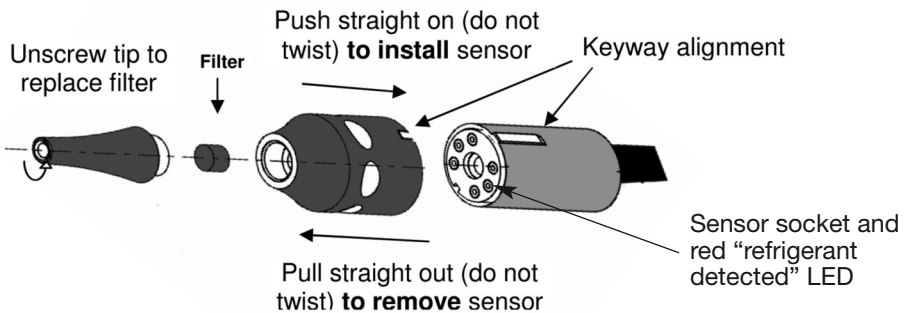


IMPORTANT: The startup sequence will not execute to completion if the refrigerant gas sensor cannot be heated. That would be the case if the sensor becomes electrically disconnected from the probe.

The sensor (which is under the black probe tip assembly) is physically and electrically connected to the probe by a six-pin socket visible under the clear plastic near the red “refrigerant detected” LED near the end of the probe (see figure below).

If the startup sequence fails to complete after 60 seconds, abort the process by powering off the unit. Then check the integrity of the connection between the sensor and the probe by doing the following:

- 1) Pull the black probe tip assembly straight out and away from the sensor socket without twisting it. This disconnects the sensor.
- 2) Line up the keyway notch on the probe tip assembly with the raised keyway on the sensor socket holder
- 3) Carefully push the sensor back into the socket without forcing or twisting it; misalignment can damage the sensor’s pins. This reconnects the sensor.



CHECKING FOR LEAKS

Position the end of the RLD400's flexible-obedient probe—which retains its configured shape—close to any suspected source of leaking refrigerant gas. In a vehicle, wet oily areas around hose connections and fittings, and greasy streaks radiating outward around the compressor clutch or on the underside of the hood just above the compressor are telltale signs of a leak. Another place to check sooner rather than later is the evaporator (located inside the heater/defroster plenum under the dash).

Whenever the sensor at the end of the probe senses a refrigerant gas that it has been designed to detect:

- 1) The red LED at the end of the probe will begin flashing much faster than three times every two seconds
- 2) The beeper will increase its own frequency correspondingly
- 3) A number from 1 to 9 will appear in the digital leak size indicator window.

The reading reflects the concentration of refrigerant gas sensed. The maximum value will be displayed when the tip of the probe is at the source of the leak. Try switching between different sensitivity levels while moving the probe until the highest number appears.

To raise the sensitivity level, press the **SENS.** button once; this will light the red LED labeled **HI**. To lower the sensitivity level, press the **SENS.** button again; this will light the yellow LED labeled **LO**.

The table below can be used to approximate the size of a leak.

Maximum Value Displayed	Leak Size (oz./yr)
1 to 3	< 0.1
4 to 6	0.1 to 0.5
7 to 9	>0.5

Note re: Cross sensitivity to automotive chemicals

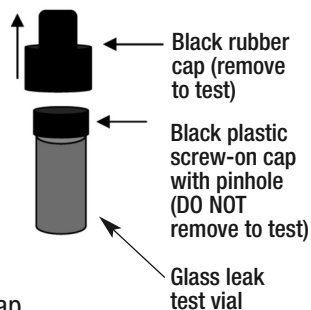
Some automotive solvents and chemicals have hydrocarbon properties similar to R134a and therefore may produce a non-zero reading on the digital leak detector. Before checking for refrigerant leaks, clean up any chemicals in the list below, which may produce a positive response.

Brand/type	Response
Rain-X windshield washer fluid	Y
Ford spot remover (wet)	Y
Ford rust inhibitor	Y
Ford gasket adhesive (wet)	Y
Loctite Natural Blue degreaser (diluted)	Y
Ford brake parts cleaner	Y
Ford silicone rubber (uncured)	Y
Motorcraft antifreeze heated to 160°F	Y
Gunk liquid wrench	Y
Ford pumice lotion (with solvent)	Y
Ford Motorcraft brake fluid	Y
Ford carburetor cleaner	Y

USING THE LEAK TEST VIAL

The RLD400 ships with a leak test vial that lets you check whether the instrument is working properly. To perform this check:

- 1) Remove the leak test vial from its Ziploc plastic bag and remove the black rubber cap from the top of the vial. The cap pops off, rather than unscrews (see figure below). The first time you use the vial, you must remove and discard the circular insert under the black plastic screw-on cap with pinhole.
- 2) Power on the RLD400 and wait for it to complete the three-step startup sequence.
- 3) Position the tip of the probe at the pinhole in the top of the vial's screw-on cap. If the RLD400 is working properly, the beep rate and the flashing frequency of the red LED near the probe tip will increase dramatically. A number between 4 and 6 should appear on the digital leak size indicator if you are using the vial included with the unit.
- 4) Put the black rubber cap back over the vial's screw-on cap.
If you do not, the contents of the vial will evaporate over time.



NOTE: If the above check does not produce a non-zero reading, either your leak test vial is empty or your RLD400 is defective. If the bottom of your leak test vial does not appear green, replace the vial. To locate a replacement, search the Internet for “Refrigerant leak detector reference”.

If a full leak test vial does not produce a non-zero reading, it is likely that your RLD400 is defective (or requires a new sensor). General will repair or replace your unit (or its sensor) if you purchased it within the past two years and have complied with the terms of the RLD400's limited warranty. Contact our Customer Service department at 212-431-6100 to obtain a Return Goods Authorization (RGA) number before shipping the unit.

SPECIFICATIONS

Refrigerants Detected	R-134a, R-410a, R-404a, R-407c, R-507, CFC-12 (R-12 or Freon), R-22, R-1234yf
Detection Modalities	Sound, light, leak size measure
Sensitivities	0.05 oz./yr (1.4 g/yr) for R-134a; 0.025 oz./yr (0.7g/yr) for R-22
Sensor Type	Proprietary solid electrolyte semiconductor
Sensor Life	>300 hours (ten years' normal use)
Warmup Time	17–20 seconds
Response Time	Instantaneous
Display Type, Size	7-segment red LED, 0.6 in. (15mm) high
Dimensions of Instrument	6.8 x 2.6 x 2.2 in. (173 x 66 x 56mm) w/17 in. (432mm) probe
Weight of Instrument	1.5 lb. (680g)
Dimensions of Carrying Case	15 x 11 x 4 in. (382 x 279 x 102mm)
Weight of Instrument, Batteries and Carrying Case	2 lbs, 5.5 oz. (1.06kg)
Complies with	SAE Standards J2791 and J2913, European Standard EN14624
Limited Warranty Term	2 years (including sensor)
Power Source	4 “AA” batteries (included)
Battery Life	5 hours continuous operation (typical)

MAINTENANCE INSTRUCTIONS

CHANGING BATTERIES

When the red front-panel LED labeled **Low Battery** lights up, it's time to replace the instrument's four “AA” batteries. To do so, follow the procedure in the Setup Instructions section of this manual.

CHANGING THE FILTER

The RLD400 ships with a pack of five small disc filters that install upstream of the sensor. Replace the filter whenever it becomes visibly dirty, or every few months, depending on use.

To change the filter, unscrew the black plastic tip of the probe from the black plastic sensor enclosure (see figure on p. 6.) Remove the old filter, install the new one, and then screw the plastic tip back into the enclosure.

WARRANTY INFORMATION

General Tools & Instruments' (General's) RLD400 Digital Refrigerant Leak Detector with Pump is warranted to the original purchaser to be free from defects in material and workmanship for a period of two years. Subject to certain restrictions, General will repair or replace this instrument if, after examination, the company determines it to be defective in material or workmanship.

This warranty does not apply to damages that General determines to be from an attempted repair by non-authorized personnel or misuse, alterations, normal wear and tear, or accidental damage. The defective unit must be returned to General Tools & Instruments or to a General-authorized service center, freight prepaid and insured.

Acceptance of the exclusive repair and replacement remedies described herein is a condition of the contract for purchase of this product. In no event shall General be liable for any incidental, special, consequential or punitive damages, or for any cost, attorneys' fees, expenses, or losses alleged to be a consequence of damage due to failure of, or defect in any product including, but not limited to, any claims for loss of profits.

RETURN FOR REPAIR POLICY

Every effort has been made to provide you with a reliable product of superior quality. However, in the event your instrument requires repair, please contact our Customer Service to obtain an RGA (Return Goods Authorization) number before forwarding the unit via prepaid freight to the attention of our Service Center at this address:

General Tools & Instruments
80 White Street
New York, NY 10013
212-431-6100

Remember to include a copy of your proof of purchase, your return address, and your phone number and/or e-mail address.

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Specifications subject to change without notice

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