

RLD-H10PM Refrigerant Leak Detector

The RLD-H10PM is a professional grade leak detector for use by refrigeration and air conditioning technicians. This detector senses all CFC, HCFC, and HFC refrigerants and blends, such as R12, R502, R22, R404a, R507, and R134a among others. The RLD-H10PM is self-powered with a rechargeable battery and provides both manual and automatic compensation for background levels of refrigerant. A full line of accessories and maintenance kits are also available, including replacement sensors, tune-up kits, probe extensions, battery chargers, and leak vial bottles.



Figure 1: RLD-H10PM Leak Detector

Features and Benefits	
<input type="checkbox"/> Positive Ion Emission Heated Diode Sensor	Provides the most sensitivity available today, while still detecting all halogenated refrigerant gases
<input type="checkbox"/> Rechargeable Battery with Low and Full Charge LEDs	Enhances portability--no external power required
<input type="checkbox"/> High Quality Air Pump	Supplies constant air flow to sensor so it responds quickly to leaks; also helps sensor recover quickly after exposure to refrigerant so leak can be verified
<input type="checkbox"/> Switchable for Manual or Automatic Balance	Allows user to chose preferred method of compensation for background refrigerant levels
<input type="checkbox"/> Visual and Audible Signal	Facilitates sensing in noisy equipment rooms with 360° visibility and piercing tone; Frequency of noise/light indicates magnitude of leak
<input type="checkbox"/> Exceeds SAE J1627 Moving Probe Specification	Minimizes call-backs because the leak is found the first time, is verifiable, and the fix can be confirmed
<input type="checkbox"/> External Calibration Source and Calibration Indicators	Indicates when the sensor is working properly and serves as a reference point to judge leak size

Application Overview

Growing concern over the effects of certain refrigerants on the atmosphere has generated a strong motive to eliminate system leaks and to develop safer refrigerants. With the RLD-H10PM, you can be confident that your instrument will provide the sensitivity and capabilities to meet your service needs today and for the years to come.

The RLD-H10PM is intended principally as a service technician's tool. This detector has the capability to detect small amounts of halogenated gases, including chlorine and fluorine based refrigerants and blends.

Theory of Operation

The leak detector consists of a control unit with a manual balance adjustment and an auto balancing circuit, a probe with a 4.5 ft cable, a rechargeable battery, and a battery charger housed in a shock resistant molded polyethylene case. The sensor uses positive ion emission technology, which is based on the ionization characteristics of alkali metals. The alkali metals act as the cathode of a diode, and the anode is heated by a DC voltage. Air from the area being leak checked is pumped from the probe and into the space between the cathode and anode. If halogen gas is present, it creates an ionized current between the cathode and the anode, which is amplified to sound a speaker and light a neon lamp in the probe. Sensitivity can be controlled by adjusting the amount of current through the sensor (the sensor temperature).

Dimensions

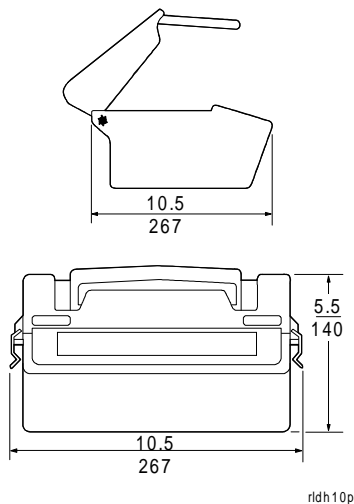


Figure 2: RLD-H10PM Dimensions (in./mm)

Accessories



Figure 3: RLD-H10-100--Flexible Probe Extension, 14 in. long



Figure 4: RLD-H10-101--Power Supply, 120 VAC (allows unit to operate from standard outlet)



Figure 5: RLD-H10-102--Cigarette Lighter Adaptor



Figure 6: RLD-H10-600R--Tune-up Kit; includes sensor, 100 filters, 4 airflow indicator balls, 3 rubber probe tips, and leak vial

Also available:

- Replacement sensor: RLD-H10-601R
- Maintenance kit; includes 100 filters, 4 airflow indicator balls, and 3 rubber probe tips: RLD-H10-602R
- Replacement leak vial: RLD-H10-603R
- Replacement battery charger (does not provide enough power to run unit off of 120 VAC outlet): RLD-H10-103

Operation



WARNING: Personal Injury Hazard.
Do not use the RLD-H10PM in an explosive or combustive atmosphere. The ambient atmosphere is drawn through the probe and over the sensor, which operates at approximately 1000°F (540°C). The resulting hot mixture of air and combustible gas could explode.

1. Slide power switch to “On” position. (See Figure 8.)
2. Slide range switch to the “Small” position. (See Figure 8.)
3. Check red “Battery Low” LED. If it glows, the battery needs to be recharged. (See section *Charging the Batteries*.)
4. Check for sufficient airflow by pointing the probe tip toward the floor and observing the airflow ball in the probe (Figure 7). If the airflow is sufficient, the ball will rise and float a small distance above the tip of the probe. If the ball does not rise, tap the probe lightly to make sure it is not sticking. If the ball still does not rise, check the filter in the probe tip as described in the *Maintenance* section.



Figure 7: Verifying Airflow

5. Allow two minutes for the sensor to warm up. When the sensor is warm, the light and sound indication should idle at around two or three beats per second.
6. Proceed to the *Calibration and Verification* section.

Calibration and Verification

For optimum performance and sensor life, check calibration frequently. Adjustments are a function of how much exposure the sensor has to refrigerant. For heavy duty service, adjustment may be required every couple of weeks, while light duty service may require adjustment only every few months.

The leak vial may be used as often as necessary and can assist in determining the size of a leak. When using the small leak range position, a leak of HFC causing an audible signal equal to that produced by the leak vial has a leak rate of approximately one-half ounce/year. When using the medium leak range position on a CFC or HCFC system, this leak rate would also be approximately one-half ounce/year.

Proper response during the calibration test verifies sensitivity and operation for both auto and manual balance mode and for all three leak size positions.

1. Ensure that the range switch is in the small position and the balance control is in the automatic position. (See Figure 8.)
2. Remove the black, sticky-label disc from the cap of the leak vial. Allow a few minutes for the leak rate to stabilize. (The leak vial is filled with enough refrigerant to last approximately six months.)



CAUTION: Equipment Damage Hazard.
Do not unscrew the cap of the leak vial, as you will damage the bottle.

3. Test operation by briefly moving the probe tip over the opening of the leak vial as if you are trying to locate a leak. It is not necessary to hold the probe over the leak, as this does not simulate field conditions.

The RLD-H10PM will respond with an increase in flash rate and sound, verifying operation, and indicating the location of the leak.

4. **Sensor Heat Adjustment:** Proper heater adjustment will provide you with optimum performance and sensor life. Observe the heater adjustment LEDs while passing the probe over the leak vial. If the sensor heat is set properly, the red “Low” LED will go out and the green “OK” LED will light as the leak is detected.
 - a. If the red “Low” LED remains lit as the leak is detected, turn the heater adjustment 1/8 of a turn higher (clockwise).

- b. If the red “High” LED is lit, turn the heater adjustment 1/8 of a turn lower (counterclockwise).
- c. Once the sensor heat has been adjusted, allow the unit to stabilize for approximately 2 minutes, and retest.
- d. Repeat, using minor heater adjustments until the unit responds properly. (See Figure 8.)

If the sensor heat is adjusted to the full heat position (fully clockwise), and the “OK” LED does not light, replace the sensor.

Note: During normal leak detection, the heater adjustment LEDs will flash randomly, based on the amount of refrigerant the sensor is detecting. *For proper calibration, set the sensor heat adjustment based on the response to the calibrated leak vial only.*

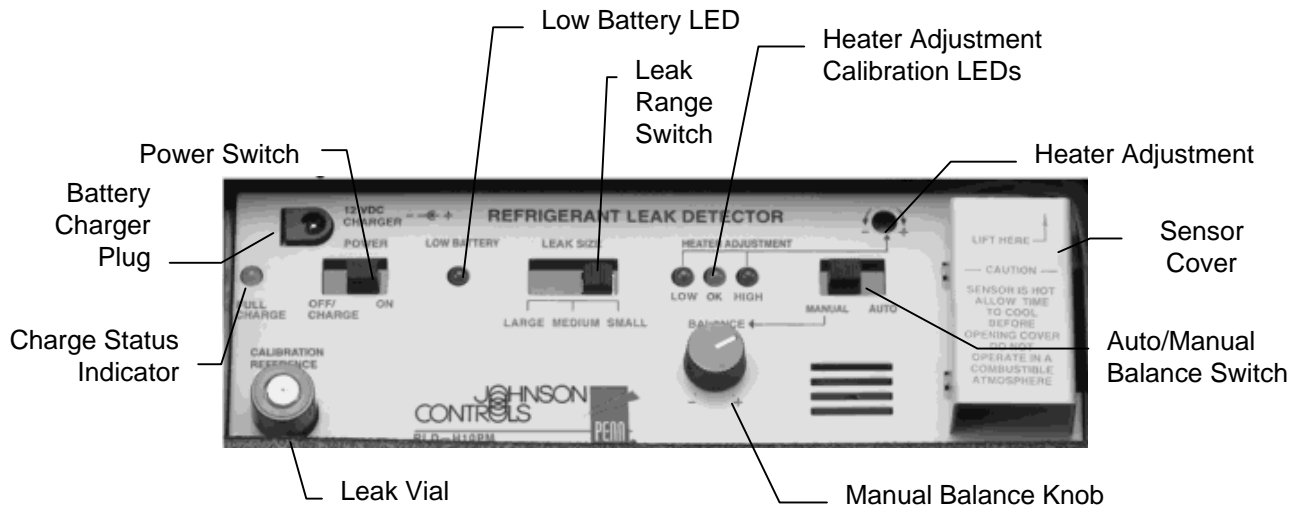


Figure 8: RLD-H10PM Faceplate

Charging the Batteries

The RLD-H10PM will run continuously for about 1.5 hours on a fully charged battery. When the red “Battery Low” LED is lit, the unit should be recharged.

IMPORTANT: The RLD-H10PM contains a gel-cell battery. To prolong the life of this type of battery: recharge the battery frequently (before it is fully discharged); do not recharge the battery for more than 12 consecutive hours. Do not allow the battery to freeze.

To recharge the unit:

1. Turn the leak detector off.
2. Plug the battery charger cord into the socket labeled “12 VDC Charger” (see Figure 8).
3. Plug the charger into any 120 VAC outlet.
4. Allow the unit eight hours to fully charge the battery. While charging, the “Full Charge” LED will be red. Battery is fully charged when the “Full Charge” LED turns green.

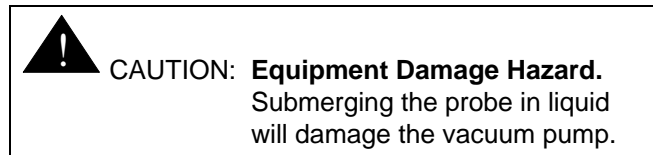
Note: The RLD-H10PM will not operate properly with the charger plugged in. To operate the unit while plugged into a 120 VAC outlet, the AC adaptor (RLD-H10-101) must be used.

Tips for Finding Leaks

- Use the black rubber probe tip whenever possible and hold the probe approximately 1/4 in. above the area being tested.
- Move the probe tip at about two inches per second along seams or joints suspected of leaking.
- Start leak checking anywhere, and continue in a logical progression through the entire system to locate all leaks.
- Set the range switch to the appropriate range to ensure maximum sensor life. If the leak size is unknown, start at the “Large” leak setting.

IMPORTANT: Exposing the sensor to large amounts of refrigerant or holding the probe over a leak for a long period of time will significantly shorten sensor life.

- The “Large” range should be used to provide some protection to the sensor when there is a chance that it will be exposed to a high concentration of refrigerant gas. If the “Large” range does not detect any leak, switch to the “Medium” range.
- On CFC and HCFC systems, the “Medium” range is sufficient to verify that the system is free of leaks that require fixing.
- On HFC systems, use the “Small” range to verify that the system is free of leaks that require fixing.
- Replace the filter often (as described in the *Maintenance* section) to retain airflow and sensitivity.
- Wipe all surfaces to be tested with a clean, dry cloth.
- Check ports for moisture before inserting the probe.



Automatic Balance Mode

- Use the Automatic balance mode in most situations. The Automatic zero function effectively blocks out background levels of refrigerant, to make finding medium or small leaks quicker.
- Continuously move the probe, at a rate of approximately 2 inches per second. As you approach a leak, the click rate will increase, and as you move away from a leak, the click rate will decrease. Use repeated passes over the suspected area to zero in on the leak.
- If the probe remains directly over the leak for several seconds, the unit will become insensitive to that level of refrigerant. To restore sensitivity, move the probe away from the leak briefly, and allow the auto balance to restore sensitivity.

Manual Balance Mode

- Use the Manual balance mode to find large leaks in areas where there is already a relatively high concentration of refrigerant gas in the atmosphere.
- When searching for a leak in manual mode, the balance will need frequent adjustment to maintain approximately two or three clicks per second. Move the probe toward the leak. If the click rate increases, you are approaching the leak, and if the click rate decreases, you are moving away from the leak. Turn the balance knob so that you are again at a two or three click per second rate, and again move the probe. By always moving in the direction that increases the click rate, you can zero in on a leak.

Maintenance

Replacing the Filter and Airflow Indicator

To protect the air pump from damage due to foreign particles and moisture, replace the filter as it becomes dirty. With moderate use (15-30 minutes per day), replacing the filter once a month is recommended. In dirty environments or with heavy use, replace the filter more frequently. Replace the filter whenever it is visibly dirty or wet.

Replacing the Filter

1. Remove the black rubber probe tip.
2. Pick out the filter with a pin or tweezers. A fine screen will remain in the tip of the probe.
3. Insert the new filter in the probe tip. (See Figure 9.) Make sure that the filter is firmly seated against the fine screen.
4. Replace the rubber probe tip.

Replacing Airflow Indicator

1. Remove the clear plastic section of the probe by gently pulling and twisting the white rubber grip. (See Figure 9.)
2. Turn the probe upside-down and tap on it to remove the old airflow indicator ball.
3. Insert the new airflow indicator ball into the probe.
4. Reattach the probe end to the hose.

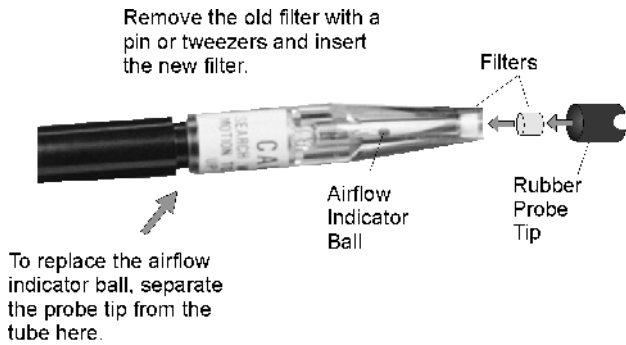


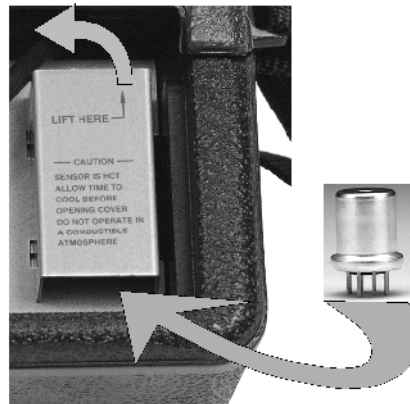
Figure 9: Replacing the Filter and Airflow Indicator

2. Unplug the power cord if the unit is plugged in, and open the sensor cover. (See Figure 8 and Figure 10.)
3. Allow the sensor to cool before handling it (approximately 15 minutes).
4. Unplug and discard the sensor.
5. Insert a new sensor and close the sensor cover.
6. Turn the heater adjustment to its full counterclockwise position. (See Figure 8.)
7. Place the unit in operation, and calibrate the new sensor. (See instructions in the *Calibration and Verification* section.)

Replacing the Sensor

The sensor is a plug-in unit that is thrown away when expended. It needs replacement when the RLD-H10PM no longer responds properly to the leak vial (see the *Calibration and Verification* section), even with the sensor heat adjustment turned fully clockwise. (The leak vial bottle must contain some refrigerant.)

1. Open sensor cover by lifting upward and outward.



2. Unplug old sensor and insert new sensor.

Figure 10: Replacing the Sensor



CAUTION: Personal Injury Hazard.
Sensor surface temperature may reach 200°C (390°F) during operation, and may cause a burn if not allowed to cool.

1. Turn the leak detector off.

Ordering Information

Table 2: Ordering Information

Item	Description
RLD-H10PM-1	Refrigerant leak detector and charger
RLD-H10-100	14 in. flexible probe extension
RLD-H10-101	120 VAC power supply adaptor (allows unit to run unit from 120 VAC outlet)
RLD-H10-102	Cigarette lighter adaptor (charges or operates leak detector from vehicle's cigarette lighter)
RLD-H10-103	Replacement battery charger (does not provide power to run unit from 120 VAC outlet)
RLD-H10-104	Replacement battery charger for belt pack
RLD-H10-105	Belt Pack Battery - extends the operation of the RLD-H10PM for an additional 3 hours of consecutive use; conveniently straps to your waist; includes its own charger
RLD-H10-600R	Tune-up kit; includes sensor, 100 filters, 4 airflow indicator balls, 3 probe tips, and leak vial
RLD-H10-601R	Replacement sensor
RLD-H10-602R	Maintenance kit; includes 100 replacement filters, 4 airflow indicator balls, and 3 probe tips
RLD-H10-603R	Replacement leak vial (contains enough refrigerant to last approximately six months)
RLD-H10-604R	Replacement for RLD-H10PM internal battery
RLD-H10-606R	Clear Plastic Probe Tip - replaces clear plastic section of scratched or cracked probe tips
RLD-H10-607R	Probe Replacement assembly - snaps on to air pump and has quick connects for power to lamp; replaces entire probe assembly for RLD-H10PM

Troubleshooting

Table 1: Troubleshooting

Problem	Cause	Solution
Responds to leak vial on “Large” leak setting	Heat control set too high	Decrease the sensor heat slightly by turning the sensor heater adjustment 1/8th of a turn counterclockwise. (See Figure 8.) Allow a minute for the sensor to cool, then recheck. (See instructions in the <i>Calibration and Verification</i> section.)
No response to leak vial	Leak vial empty	Reorder leak vial (RLD-H10-603R).
	No air flow (Airflow indicator ball in probe does not float.)	Replace filter in probe tip (RLD-H10-602R). Check pump operation.
	Sensor exposed to excessive amounts of halogen gas	Move probe to clean atmosphere for several minutes while sensor purges itself. Recalibrate in clean area. (See instructions in the <i>Calibration and Verification</i> section.)
	Water in probe	While unit is operating, blow clean air (5 psig) into the probe tip for approximately one minute. Replace the filter (RLD-H10-602R).
	Heat control set too low	Increase the sensor heat slightly by turning the heater adjustment 1/8th of a turn clockwise. (See Figure 8.) Allow a minute for the sensor to heat, then recheck. (See instructions in the <i>Calibration and Verification</i> section.)
Audio normal; lamp does not flash	Burned-out or damaged probe lamp	Return unit to your Johnson Controls/PENN representative.
Responds continuously in all leak positions	Filter is clogged	Replace the filter (RLD-H10-602R).
	Dirt in sensor	Remove sensor (see Figure 10) and blow it out with clean air (not over 10 psig). If unsuccessful, replace the sensor (RLD-H10-601R). Replace the filter (RLD-H10-602R).
	Short circuit in sensor	Replace sensor (RLD-H10-601R).
	Atmosphere contaminated with excessive halogen gas	Ventilate area. Switch to large leak setting. (See Figure 8.) Reduce sensor heat if unit still responds excessively at large leak rate setting. (See instructions in the <i>Calibration and Verification</i> section.)
Responds continuously on small leak position	Excessive sensitivity	Decrease the sensor heat slightly by turning the heater adjustment 1/8th of a turn counterclockwise. (See Figure 8.) Allow a minute for the sensor to cool, then recheck. (See instructions in the <i>Calibration and Verification</i> section.)

Repair Information

Should it become necessary to repair your RLD-H10PM, please contact your Johnson Controls/PENN product representative, or call Johnson Controls Refrigeration Application Engineering at 414-274-5535.

Warranty Repairs

Units under warranty will be shipped to the repair center. The repairs will be completed within 24 hours after receipt by the repair center, and the unit will be returned at the same priority of shipment with which it was received.

Contact Refrigeration Application Engineering at 414-274-5535 for information on how to submit units for warranty repairs.

Non-Warranty Repairs

Units that are no longer under warranty will be repaired to factory specifications for a nominal fee. The repairs will be completed within five days after receipt by the repair center, and the unit will be returned at the same priority of shipment with which it was received. Contact Refrigeration Application Engineering at 414-274-5535 for information on how to submit units for repairs.

Specifications

Product	RLD-H10PM Refrigerant Leak Detector		
Power Requirements	12 VDC, charger 13.5 VDC An adaptor is available to allow unit to run from 120 VAC power (RLD-H10-101).		
Sensing Element Type	Positive Ion Emission Heated Diode		
Approximate Sensitivity	Switch Position	Alarm Sensitivity (moving probe)	
	Small	>0.05 oz per year CFC and HCFC	>0.5 oz per year HFC
	Medium	>0.5 oz per year CFC and HCFC	>1.0 oz per year HFC
	Large	>2.0 oz per year CFC and HCFC	>5.0 oz per year HFC
Leak Alarm	Audible alarm, visible neon lamp		
Response Time	Approximately 1 second		
Warmup Time	Approximately 2 minutes		
Accuracy	Meets SAE J1627 test requirements		
Probe Length	Approximately 4.5 ft (1.4m)		
Ambient Operating Conditions	32 to 104°F (0 to 40°C); 5-90% RH, non-condensing		
Ambient Storage Conditions	14 to 140°F (-10 to 60°C); 5-90% RH, non-condensing		
Case	Rugged high-density polyethylene		
Dimensions (H x W x D)	5.5 x 10.5 x 8.5 in. (140 x 267 x 216 mm)		
Shipping Weight	5 lb (2.3 kg)		
Agency Listings	UL and cUL Listed, File SA9717 CE Approved		

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



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