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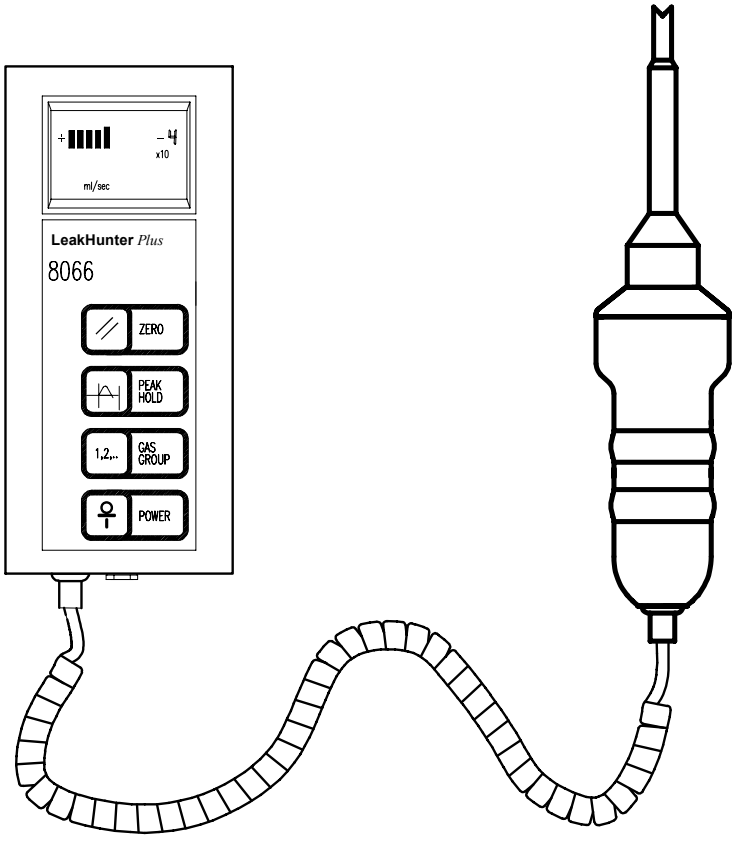
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LeakHunter *Plus* 8066
User Manual



LTR	REVISION	DATE	BY
A1	Release for Prod	11-02-95	CJC
B1	Revise Spares List	05-23-96	BT

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1.0 Introduction

The LeakHunter Plus, Model 8066, is a hand held instrument typically used for detecting leaks in gas plumbing joints, and for testing the integrity of sealed units using a tracer gas. The magnitude of the leak is indicated by a bargraph display and an audible tick.

Operation can be one, or two handed. The audible tick and a peak hold mode allows operation in awkward situations where the display is not visible. The peak hold mode causes the display to retain the highest reading detected. A nozzle is available for measuring large leaks by allowing the sample to be thirty times greater than with it off. An extended probe is supplied to facilitate access in difficult applications.

An internal pump draws leakage gas and surrounding air in through the nozzle, then over the sensor that measures the thermal conductivity of the gas/air mixture. Thermal conductivity is defined as the rate of flow of heat through a medium. The gas/air mixture escapes from the instrument via four holes in its base.

The LeakHunter Plus will indicate when a gas is present that has a thermal conductivity that differs from that of the ambient air on which it was zeroed. The instrument is normally zeroed in ambient air comprising a mixture of approximately 78% nitrogen and 21% oxygen. Hence, the instrument is not very sensitive to nitrogen or oxygen, but has a high sensitivity to helium and hydrogen since these have very different thermal conductivities from air. (See Section 8.) A gas may have a higher or lower thermal conductivity than air, and thus produce a positive or negative reading on the display. The instrument has four gas group ranges to target the gases having thermal conductivities that differ from air by different degrees.

The instrument can indicate a leak in terms of concentration (ppm), or flow rate (cfm, ml/sec or ml/min). Readings are approximateand relative; the instrument is intended to aid in the precise location of a leak, and to give an indication of its severity. Flow rate readings assume that all the leaking gas passes through the probe: If some of the leaking gas escapes to the surrounding air, without passing through the instrument, the flow reading will be inaccurate to that extent.

The unit is battery operated using standard or rechargeable battery cells. A power transformer is supplied for operating the unit from a 120VAC source.

Section 1 Unpacking

LeakHunter Plus 8066

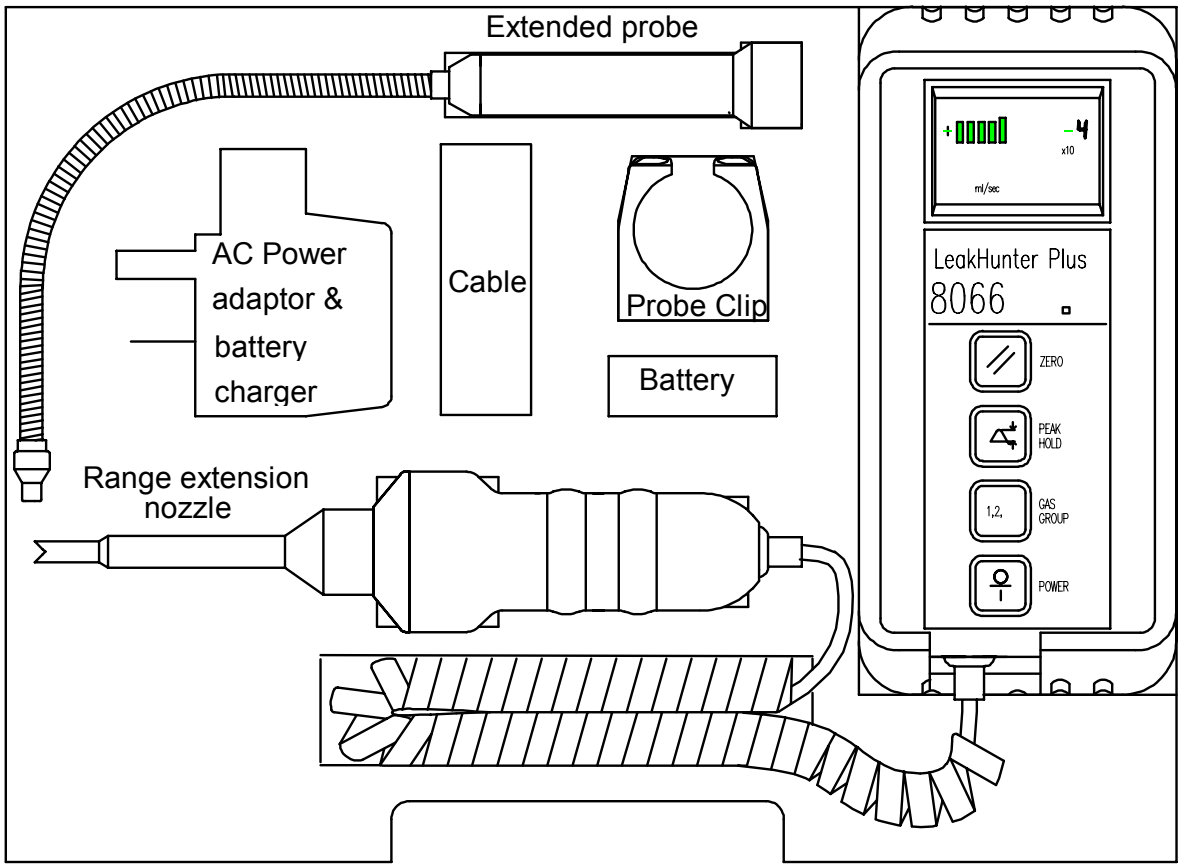


Figure 1 case contents

Check that the following are supplied:

- Range extension nozzle
- *Probe clip and template
- AC power adapter and battery charger
- Battery
- User manual
- Cleaning wipe
- Extended probe

* The clip attaches permanently to the rear of the instrument. The probe slides into the clip so that one-handed operation is possible. Since the clip is quite large, you may decide not to install it if you intend to carry the instrument around in your pocket.

1.1 Attaching the probe clip

A template is supplied to permit accurate positioning of the clip. Note that the adhesive on the clip is permanent, and once fitted, the clip is not easily removed.

1. Clean the rear of the box using the wipe supplied. Allow the surface to dry.
2. Position the template onto the rear of the instrument as shown in Figure 1.
3. Peel off the paper that protects the adhesive on the back of the clip.

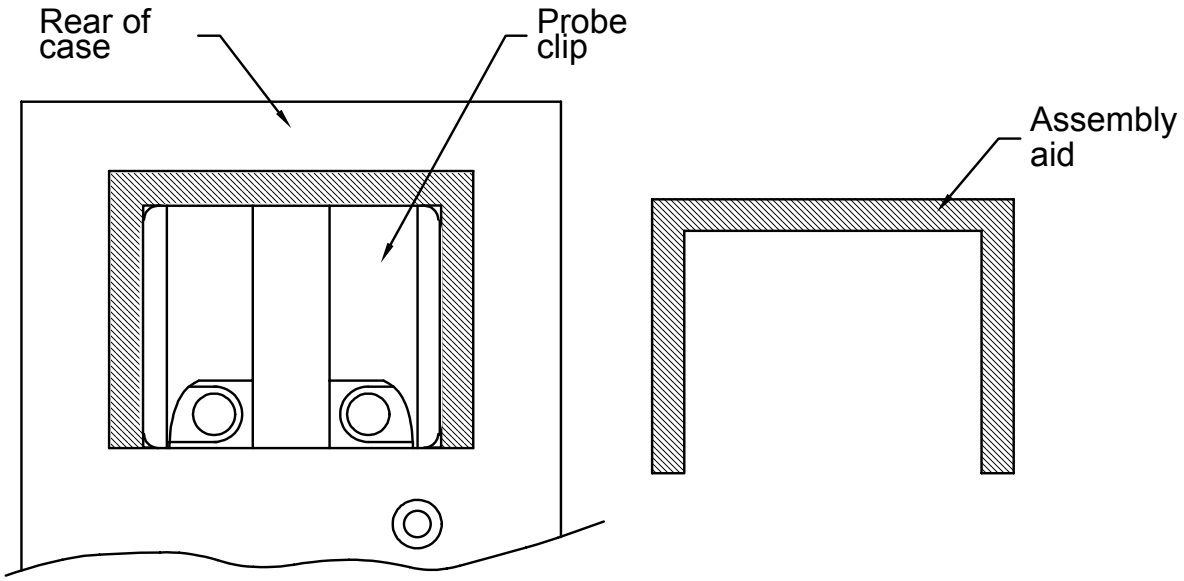


Figure 2 Probe clip template

4. Carefully position the clip in the position defined by the template and press it firmly in position.
5. Remove the template.
6. The probe can now be clipped to the instrument for one-handed operation. Pass the cable through the slot in the clip, then push the probe into the clip until it clicks into place.
7. To remove the probe, simply pull it forward out of the clip.

Section 2 Specification

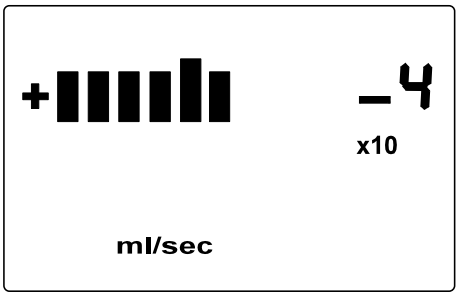
Maximum sensitivity under ideal conditions	He $1x10^{-5}$, R12 $8x10^{-5}$, CH_4 $1x10^{-4}$, $C0_2$ $1x10^{-4}$ (ml/s)
Detector	Dual cell micro volume thermal conductivity cell
Detects	All gases with a thermal conductivity different from air
Display units	cm^3/s, cm^3/min, cu ft/min, ppm - selectable
Functions	Peak hold, Zero, Calibrate, Gas type, nozzle type
Response time	Approximately 1s
Recovery time	Approximately 1s
Audio	Signal proportional to leak rate.
Diagnostics	Battery low indication Detector cell failure alarm
Operating time	4 hours maximum from rechargeable battery
Battery	One PP3 dry cell or rechargeable
Mains supply	115V 50/60 Hz
Carrying case size	3.5 x 10 x 14 (inches) (8.9 x 25.4 x 35.6 cm)
Weight: Hand unit Total, inc. case	 440 g (1 lb) 1.5 kg (3.3 lb)

Section 3 Controls and Indicators

Pictures of the display and controls are shown at the rear of this manual.

3.1 Bargraph and exponent

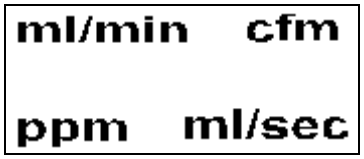
The bargraph and exponent indicate the leak rate in terms of the selected units. For example, a leak rate of +6 x10^{-4} ml/sec would appear as shown opposite.



3.2 Zero

Operating this button sets the detected value, the display, and audible signal to zero.

3.3 Units



Press **ZERO** and **GAS GROUP** together to step through the available units of measure to set the one desired. The correspondence between leak rate settings depends on the sample flow rate. If accurate measurements are required the instrument should be calibrated in the same mode as it will be used.

3.4 Peak hold



Press **PEAK HOLD** to select and display the Peak Hold symbol on the screen. In this mode, the instrument shows the highest positive, or negative, value measured since the mode was entered. Press **PEAK HOLD** again to exit this mode. The audible leak indication remains unaffected.

3.5 Gas group button



Use this button to see and select the required gas group. Upon pressing the button, the display will blank except for the Leak Rate Exponent which shows the current gas group. After two seconds, the displayed number will start to cycle through the gas groups 1 to 4.

To keep the current gas group, press the button again immediately. To select a different gas group, press the button again when the required group number is visible.

The gas groups, and thermal conductivities, are listed in Section 8.

3.6 Power button

Use this button to turn the instrument on and off.

3.7 Nozzle present 

A range extension nozzle is available for monitoring high leak rates. The nozzle diverts 97% of the air input away from the sensor so that a much larger flow can be handled. After attaching the nozzle, press **PEAK HOLD** and **GAS GROUP** together so that the Nozzle Present symbol appears on the display. Where a flow rate is being indicated, the instrument adjusts the reading to adjust for the fact that 97% of the flow is bypassing the sensor. Concentration (ppm) values will not be affected.

Upon removing the nozzle, press **PEAK HOLD** and **GAS GROUP** again to remove the Nozzle Present symbol.

The same operations should be carried out when attaching, or removing, the extended probe supplied as part of the **8066**.

3.8 Battery low 

This symbol becomes visible when the battery is low. Refer to Section 6.

Section 4 Operation

4.1 Starting up and switching off

Press the **POWER** button to turn on the instrument. During the first six seconds (approx.), the instrument performs a start-up and test sequence. After this, the instrument can be switched off by pressing the **POWER** button again.

If the battery voltage is below the operating threshold, the instrument will switch off automatically.

If no buttons are pressed for 15 minutes, the instrument will turn itself off. An audible warning will occur for 5 seconds before it turns off. Pressing any button during this period will keep the instrument on for another 15 minutes.

4.2 Measurement

To use the instrument:

1. If necessary, press **ZERO** and **GAS GROUP** repeatedly to select the required units. See Section 3.3.
2. Use **GAS GROUP** to check/select the appropriate gas group. See Sections 3.5 and 8.
3. Press **ZERO** to zero the meter reading on the instrument, well away from the leak.
4. Use the instrument to trace the leak. The bargraph display and exponent, along with the audible ticks, indicate the extent of the leak.

For awkward situations, the instrument can be used one-handed with peak hold selected. See Section 3.4.

4.3 Sensitivity setting

To contend with various leak rates, the instrument has three decade ranges: 1, 10 and 100. This is particularly pertinent to the audible ticks: The dynamic range of the audible ticks is only 100:1, and will saturate in the presence of high gas concentrations unless the sensitivity is reduced.

At switch-on, or if the units are changed, the instrument defaults to the most sensitive range.

To change the sensitivity range, press and hold **ZERO** then press **PEAK HOLD**. You will see the displayed exponent change with the change of sensitivity. For instance, with ml/sec units, successive exponents will be -5 (most sensitive range),-4 and -3, for a zeroed reading. Press **ZERO** and **PEAK HOLD** again to select the desired sensitivity.

For flow measurements, you can use the x30 nozzle as an alternative to reducing the sensitivity level. The x30 nozzle allows the instrument to cope with higher leakage flow rates without reducing the dynamic range of the instrument.

4.4 x30 nozzle

This nozzle allows the measurement of flow rates with high volume leaks that are beyond the normal range of the instrument. The nozzle diverts approximately 97% of the gas/air mixture away from the sensor so that the instrument can handle approximately 30 times the normal maximum leak rate. The instrument must be told that the nozzle is installed so that leak rate readings are adjusted accordingly (i.e. 30 times the actual measured rate).

1. Attach the nozzle over the normal nozzle and locate it securely on the housing.

2. Press the **PEAK HOLD** and **GAS GROUP** buttons together to make the Nozzle Present symbol appear on the display.

The extended probe has a similar effect to the x30 nozzle. Note that the response and cleardown times are increased when the extended probe is fitted.

To restore the instrument to its normal state, remove the nozzle and press **PEAK HOLD** and **GAS GROUP** to remove the Nozzle Present symbol.

4.5 Calibration

The instrument is not intended for accurate measurement of leaks; for normal leak tracing, no calibration is necessary. The instrument is factory calibrated to a helium leak. However, it is possible to improve the accuracy of the instrument for a particular gas by calibrating it. You will need access to a standard leak, or known concentration of the required gas.

1. Set up the instrument to the required state: units, nozzle (not) present and gas group.
2. Present the instrument with a null sample (air) and press **ZERO**.
3. Hold down **ZERO** and press **POWER** briefly. Release both buttons. The units indication on the display will flash to indicate that the instrument is in calibration mode. The audible ticks are disabled.
4. Present a standard leak, or concentration of gas, to the instrument.
5. Set the display bargraph and exponent to read the standard leak flow rate or concentration: use **PEAK HOLD** to increase the displayed value, or **GAS GROUP** to reduce it.
6. Pressing **ZERO** will zero the display. Pressing **POWER** will set the calibration to the general default. The  symbol will become visible to indicate that the general default calibration is in use.
7. Press **ZERO** and **POWER** again to restore normal instrument operation.
8. Check that the instrument reads the correct flow rate or concentration when presented with the standard leak rate or concentration.

Section 5 Batteries

Either a standard alkaline, or rechargeable Ni-Cad, battery may be used. Change, or replace, the battery if the Battery Low symbol  appears on the display. If the battery voltage falls to an unacceptable level the instrument will switch itself off.

To change the battery, turn off the instrument, remove the battery cover on the rear cover, unplug the old battery, install the new one in its place.

The instrument will run from the battery or the AC adapter. The internal battery is disconnected when the adapter is plugged in.

The battery must be removed from the instrument for recharging; it cannot be recharged in the instrument.

Section 6 Accessories

6.1 AC power adapter and battery charger

The meter can be used with the ac power adapter without removing the battery. Plug the smaller of the two female connectors on the adapter into the base of the meter. Plugging in the adapter disconnects the internal battery.

The adapter is for indoor use only.

The battery charger is for indoor use with Ni-Cad batteries only. Do not attempt to recharge other types of battery as damage or injury may result. Recharging time is 16 hours for a standard capacity battery and 19 hours for a high capacity battery. Recharging a partially discharged battery can reduce its capacity.

6.2 Extended probe

Attaching the extended probe has the same effect on instrument sensitivity as fitting the range x30 nozzle. With the extended probe attached, the instrument will take longer to respond to a leak, and to clear down afterwards.

Section 7 Servicing

7.1 Trouble shooting

Symptom	Probable Cause	Cure
Instrument lacks sensitivity	Probe connection loose on gun nozzle	Tighten coupling around probe
Response time too long	Capillary inside probe partially blocked	Replace probe, or clear it with a fine wire
	Probe connection loose on gun nozzle	Tighten coupling around probe
Unstable reading on high sensitivity	Large amounts of tracer gas in atmosphere	Allow atmosphere to clear, or move test site.
	Probe connection loose on gun nozzle	Tighten coupling around probe
Instrument will not power up	Depleted battery	Replace battery, or use AC power adapter
	Wrong connector used on AC power adapter	Make sure smaller female connector is used on unit.

7.2 Error indications



Battery low. See Section 5.



Instrument calibration lost, and general calibration in use. Recalibrate. See Section 4.5. At switch-on, this error is indicated by a constant leak rate exponent digit 0 or 1 on the display.



In the event of a serious fault with the instrument, the leak rate exponent digit flashes. The digit value indicates the nature of the fault for diagnostic purposes. There are no feild repairs at this point. Call Customer Service (800-828-4313) to arrange return of the instrument for repair.

7.3 Spares list

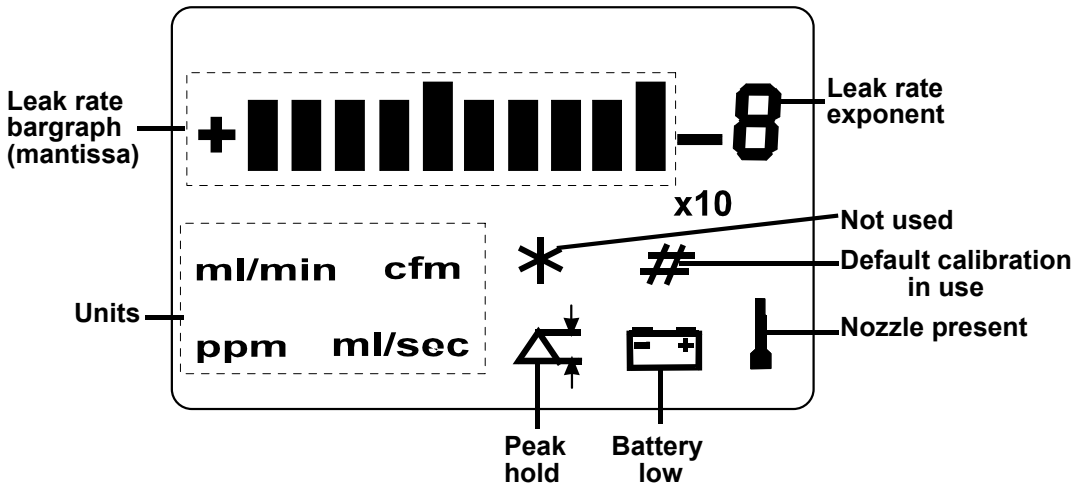
Item	Part No.
Replacement Standard Probe	8066-03
Replacement Extension Probe	8066-04
115V AC Charger Adapter	8066-05
220V AC Charger	8066-06
Replacement Capillary Tube	8066-07
Replacement Battery Cover	8066-08
Replacement Probe Clip	8066-09
220V AC Adapter	8066-10
User Manual	8066-11

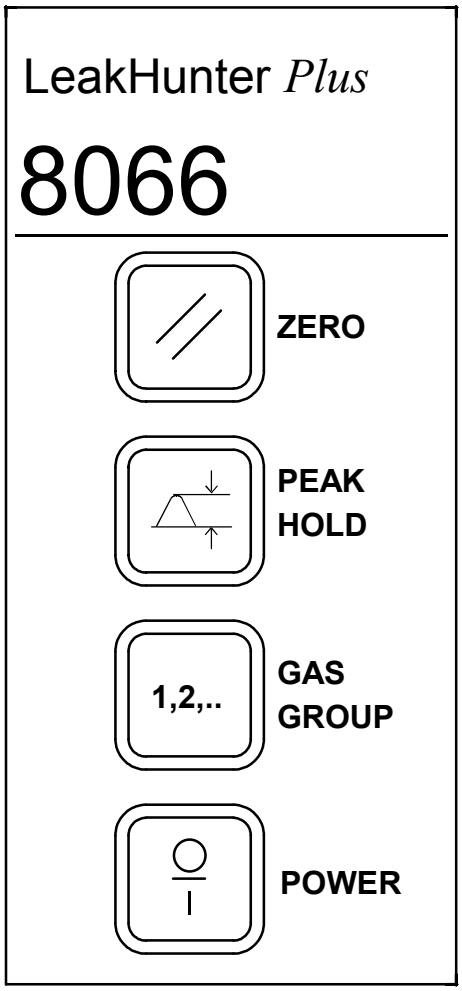
Section 8 Gas Groups

Gas group	Gas	Relative response	Pol	Minimum detectable leak			
				ml/s	ml/min	cu ft/min	ppm
1	Hydrogen	295	+	8.10E-06	4.9E-04	1.7E-08	1.3E+02
	Helium	240	+	1.00E-05	6.0E-04	2.1E-08	1.6E+02
2	Neon	41	+	5.80E-05	3.5E-03	1.2E-07	9.3E+02
	Xenon	41	-	5.81E-05	3.5E-03	1.2E-07	9.3E+02
3	R11	35	-	6.84E-05	4.1E-03	1.5E-07	1.0E+03
	R12	30	-	7.90E-05	4.7E-03	1.7E-07	1.3E+03
	R21	30	-	7.98E-05	4.8E-03	1.7E-07	1.3E+03
	R22	25	-	9.46E-05	5.7E-03	2.0E-07	1.5E+03
4	Methane	23	+	1.06E-04	6.4E-03	2.2E-07	1.8E+03
	Argon	18	-	1.37E-04	8.2E-03	2.9E-07	2.2E+03
	CO_2	16	-	1.53E-04	9.2E-03	3.2E-07	2.4E+03
	Water	14	-	1.75E-04	1.1E-02	3.7E-07	2.8E+03

Minimum detectable leak is the smallest leak that the instrument will detect under ideal conditions.

Warning: Hydrogen and Methane are explosive in some concentrations, and this instrument is not intrinsically safe.


Leak rate bargraph (mantissa)
Leak rate exponent
x10
Not used
Default calibration in use
Units
ml/min
cfm
ppm
ml/sec
Nozzle present
Peak hold
Battery low


LeakHunter *Plus*
8066
ZERO
PEAK HOLD
1,2,..
GAS GROUP
POWER

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