



LeakPal™

PORTABLE GAS DETECTOR & MONITOR

General Description

LeakPal is a portable gas detector and monitor suitable for hydrocarbons such as methane and propane, refrigerants such as freon, and inorganic gases such as ammonia and hydrogen. It will also detect leaks of certain toxic gases such as H₂S and SO₂.

The device runs on two AA batteries that can be either alkaline or rechargeable NiCad types. Fresh batteries allow over ten hours of continuous use.

LeakPal has two modes of operation: As a leak detector and as a level monitor.

Leak Detection Mode features a user-adjustable sensitivity control that allows the operator to scale back the sensitivity so that the exact source of a leak may be pinpointed.

Monitor Mode allows the detector to be pre-calibrated to a specific concentration of gas and to alarm only when that same or a higher concentration is encountered in the field.

Electrically the device is rated non-incendiary, meaning that it will not ignite an explosive environment under no-fault conditions. The device is NOT meant for operation in environments designated as Hazardous Environments.

POWERING

Use only two AA batteries of either alkaline type (1.5V each) or NiCad type (1.2V each). Observe the battery polarity indicated on the battery holder.

Note: Use of inappropriate battery types or improper observance of polarity can cause permanent damage to the detector and can generate destructive energies!

Note: Do not change batteries in a dangerous, gas-filled environment!

POWERING ON/OFF

The unit's power switch is located on the center left side. To power the unit on, slide the switch forward. To turn it off, slide the switch to the rear position.

Note: To conserve battery life, remember to turn the unit off after use.

POWER UP SEQUENCE & DETERMINING MODE

When the unit is powered on, it will flash its lights and beep its horn to indicate that these devices are functional.

At the instant of powering, the unit will:

- Beep and flash **once** to indicate that it is in **Leak Detector Mode**.
- Beep and flash **twice** to indicate that it is in **Monitor Mode**.
- Beep and flash continuously if the sensor is faulty.
- Turn on the Low Battery indicator light if the batteries are low.

WARM UP

After being turned on, and if no fault conditions are detected, the unit will begin a 20 seconds warm-up period. This is to allow the sensor to reach its proper operating temperature. During the warm-up, the green light will blink on and off until the warm-up is complete. After the warm-up is over, the green light will stop blinking and will remain illuminated to indicate that the unit is ready for use.

Leak Detection Mode

DESCRIPTION

In Leak Detection Mode the unit's sensitivity can be adjusted to respond to the slightest gas presence, or the sensitivity can be scaled back in order to provide indication of increasing gas concentrations at near saturation levels. At its most sensitive setting, *LeakPal* can indicate a gas presence of as little as 10 parts-per-million.

INCREASING/DECREASING SENSITIVITY

The unit's sensitivity is controlled by a thumbwheel located on the center right hand side. Turn the control towards the back to increase sensitivity.

Note: Setting the control to the sensitive end-of-travel can produce alarm indications even in clean, gas-free air. The proper most sensitive setting is where the alarms are just about to turn on in clean air.

Note: Even at the least sensitive setting, the detector is still able to provide indication of increasing gas levels – although at much higher concentrations.

OPERATION

The operation described below is available when the device is in Leak Detector Mode. The user is informed that the device is in this mode if only one beep and flash is issued when the unit is turned on. If the unit has been set to Monitor Mode, then the sensitivity control will not respond to adjustments.

To detect a leak, use the following procedure:

1. Power on the unit in a clean air environment in Leak Detection Mode.
2. Wait for the warm-up period to elapse (the green light stops blinking).
3. Set the device to the most sensitive setting that does not produce alarms.
4. Commence searching for the gas leak. When a gas presence is encountered, the first yellow light will illuminate and the unit will begin to beep.
5. As increasing concentrations of gas are encountered, successive yellow lights will illuminate and the frequency of the beeps will increase.
6. When the red light illuminates and the leak source has still not been found, keep the detector in the same location and decrease the sensitivity to the point where only the first yellow light is illuminated.
7. Repeat steps 5. and 6. until you arrive at the leak source.

ENABLING LEAK DETECTION MODE

A unit that is in Monitor Mode can be forced into Leak Detection Mode by using the following procedure:

1. Turn the unit off.
2. While keeping the **SET** button depressed, turn the unit on.
3. If the unit only beeps and flashes once at turn on, then it already is in Leak Detection Mode – release the **SET** button and let the warm-up complete.
4. If the unit beeped twice at turn on (indicating Monitor Mode), keep the **SET** button depressed for three seconds. The unit will beep at the end of three

seconds to indicate that Monitor Mode has been released and that Leak Detection Mode has been enabled. Release the **SET** button and allow the warm-up to complete.

Note: No confirming beep will be issued in step 4. if the unit was already in Leak Detection Mode.

Note: Leaving Monitor Mode will cause whatever alarm set point that was memorized to be lost.

Monitor Mode

DESCRIPTION

In Monitor Mode *LeakPal* responds to a preset concentration of gas. The preset alarm level is stored in permanent memory and is not lost when the device is turned off. In this mode, the sensitivity control is only used to set the alarm level – thereafter the control is ignored. When the monitored gas concentration matches or exceeds the alarm level, the first yellow light turns on and the beeper sounds periodically. As the monitored gas concentration increases, successive lights illuminate and the beeper sounds more frequently.

This mode of operation allows one to ignore gas concentrations that are below the level of interest. Furthermore, deliberate de-activation of the sensitivity control prevents inadvertent changing of the alarm set point in the field.

ESTABLISHING AN ALARM SET POINT (ENTERING MONITOR MODE)

To set a new alarm set point, the sensitivity control must be reactivated by returning the detector to Leak Detection Mode. Please see ENABLING LEAK DETECTION MODE.

The procedure to set an alarm set point (calibration) is as follows:

1. Power on the unit in a clean air environment in Leak Detection Mode.
2. Wait for the warm-up period to elapse (the green light stops blinking).
3. Expose the sensor to the test gas mixture that represents the gas concentration of interest.
4. Adjust the sensitivity control to the point where the first yellow light just begins to illuminate and the beeping starts.
5. Depress the **SET** button and keep it depressed for three seconds. At the end of three seconds, the unit will issue a beep to indicate that the set point has been memorized and that Monitor Mode has been established.

Note: You will be unable to set a new alarm set point unless the unit is returned to Leak Detector Mode at the outset.

Note: The established alarm set point is stored in non-volatile memory and will not be lost if the device is powered off or even if the batteries are removed. The setting can only be deleted by deliberately returning to Leak Detection Mode.

OPERATION ONCE SET POINT IS ESTABLISHED

Each time the unit is turned on, it will issue two beeps and flashes to indicate that it is in Monitor Mode, will be using the memorized alarm setting, and will be ignoring the sensitivity control.

When a gas concentration is encountered that matches or exceeds the alarm set point, the unit's first yellow light will illuminate and it will start to beep. As the concentration increases, successive lights will illuminate and the frequency of the beeping will increase.

Note: The sensor's response is logarithmic. The second yellow light illuminated does not necessarily indicate a concentration double that indicated by the first light. Successive lamp illumination due to increasing gas concentration is an exponential function, and the last (red) light may indicate a gas concentration that is orders of magnitude greater than the alarm set point (first yellow light).

STABILITY & ACCURACY OF SET POINT

The unit will reproduce alarms according to the set point with a high degree of accuracy (better than 3% of alarm concentration for alarm concentrations greater than 5,000ppm) provided that the calibration procedure is performed under conditions of temperature, humidity and flow-rate that are similar to those anticipated in the field.

Depending on the type of field use (E.G. frequent exposure to very high concentrations), the accuracy of the alarm setting may deteriorate with time and ought to be checked on occasion through re-exposure to the test gas mixture. When the accuracy no longer meets requirements, the unit may be re-calibrated using the procedure described earlier.

Summary of Indications

INDICATIONS AT TURN ON TIME

Alarm Lights:

- All flash once: Device in Leak Detection Mode (sensitivity control active).
- All flash twice: Device in Monitor Mode (alarm set point in use).
- All flash continuously: Sensor has failed.
- Green is blinking, others are off: Warm-up in progress
- No illumination: Batteries are low or dead.

Sound:

- One beep: Device in Leak Detection Mode (sensitivity control active).
- Two beeps: Device in Monitor Mode (alarm set point in use).
- Constant beeping: Sensor has failed.
- No beep: Batteries are dead.

INDICATIONS AFTER WARM-UP TIME

Alarm Lights:

- Only green illuminated (steady): No alarm indication
- Green and others illuminated (steady): Alarm indication
- All flash continuously: Sensor has failed.
- No illumination except one flash per minute: Batteries are low.
- No illumination at all: Batteries are dead.

Sound:

- No beep (Green light on): No alarm indication.
- 1 beep per second: Alarm corresponding to first yellow light.
- 2 beeps per second: Alarm corresponding to second yellow light.
- 4 beeps per second: Alarm corresponding to third yellow light.
- 8 beeps per second: Alarm corresponding to red light.
- Fast beeping with lights flashing: Sensor has failed.
- No beep (Green light off): Batteries are low or dead.
- 1 beep every minute: Batteries are low

LOW BATTERY INDICATION

The Low Battery indicator light illuminates when there is less than 30 minutes of operating time remaining. Normal device operation will continue for some time.

When the battery power level drops to less than 5 minutes of operating time remaining, the unit will enter a power saving mode and will no longer respond to gas. In the power saving mode, the alarm lights will extinguish and the beeper will fall silent – except to issue one flash and beep every sixty seconds. Eventually, the unit will simply cease to indicate at all until the batteries are changed.

Specifications

Sensor Type:	Metal Oxide Semiconductor (MOS)
Sensor Life:	5 years+
Lower Detection Limit:	10 parts-per-million (PPM)
Upper Detection Limit:	Unlimited
Response Time:	Less than 1 second, T90 in less than 5 seconds
Recovery Time:	Less than 5 seconds (typical)
Leak Detection Alarm Point:	User adjustable (thumbwheel control)
Monitor Alarm Point:	User settable/storable (non-volatile memory)
Monitor Alarm Accuracy:	3% (for concentrations > 5,000PPM)
Safety Features:	No false safe at high gas conc., sensor fail detection
Operating Temperature:	-15°C to +70°C
Operating Humidity:	10% to 95% R.H. (Non-condensing)
Operating Pressure:	0.5 to 1.5 Atmosphere
Visual indicators:	5mm LEDs. (1 Green, 3 Yellow, 1 Red)
Audio indication:	Multiple beep rate, 80dB at 30cm
Input Devices:	Thumbwheel control (sensitivity), Alarm SET button
Control Circuitry:	HCMOS micro controller, 8-bit A/D
Power:	2 x "AA" Alkaline / NiCad batteries (user replaceable)
Continuous Operating Time:	10 hours+ (1800mAH batteries)
Low Battery Indication:	3mm red LED at < 30 minutes operating time left
Dimensions:	120mm x 35mm x 25mm
Case Material:	1mm anodized aluminum (slate gray)
Weight:	50g (excluding batteries)
Mechanical Shock:	1m drop on concrete
Country of Origin:	Canada
Safety Rating:	Non-incendiary. Not for use in Hazardous Locations

Detectable Gases & Vapors

Acetone, Acetylene, Ammonia, Aviation Fuel, Benzene, Butane, Butylene, Butadiene, Carbon Monoxide, Decane, Diethylamine, Dimethylamine, Ethane, Ethanol, Ethyl Acetate, Ethyl Chloride, Ethyl Ether, Ethylene, Ethylene Chloride, Freon, Gasoline, Heptane, Hexane, Hydrogen, Hydrogen Sulphide, Methane (Natural Gas), Methanol, Methyl Acetate, Methyl Ether, Methyl Ethyl Ketone, Methyl Chloride, Methylene Chloride, Octane, Pentane, Petroleum Naptha, Propane, Propanol, Propylene, Sulfur Dioxide, Toluene, Trichloro Ethane, Vinyl Chloride, Xylene.