



Gas Detection For Life

# INSTRUCTION MANUAL

## Model GP-204 Portable Combustible Gas Monitor

The accompanying instrument is sold and serviced in the USA by RKI Instruments, Inc. Please contact RKI Instruments for any follow up service needs, including questions, warranty issues, repairs, and spare parts and sensors. Thank you for selecting this fine instrument for your use. With proper care and maintenance, it will provide you with many years of reliable service.

## 1. GENERAL DESCRIPTION

The model GP-204 HAND HELD PORTABLE COMBUSTIBLE GAS DETECTOR is a compact battery operated portable instrument used for taking an air sample and indicating the presence and concentration of combustible gas. Samples of the air under test are drawn by means of a rubber aspirator bulb and analyzed for combustible gas content on a heated platinum filament in a Wheatstone bridge measuring circuit. A built-in meter indicates combustible gas content in units of explosibility. Power for operation of the instrument is provided by two size "D" alkaline or Ni-Cad batteries. A probe and extension hose permit withdrawal of samples from remote locations and the instrument fits in a compact leather case with over the shoulder carrying strap. The model GP-204 is suitable and recommended for testing tanks, manholes, vessels, pressure cylinders, pipelines, and other closed systems or confined spaces to determine presence or absence of combustible gas. It is a valuable aid for safety of operations whenever combustible gases or vapors are handled.

## 2. OPERATION

Before taking instrument on the job, check battery voltage. To check, put switch in VOLT ADJ position. Meter should rise to the "CHECK" position near top of scale. Lift and turn VOLT ADJ control clockwise to determine maximum voltage setting. If it cannot be set beyond mark, batteries need recharging or replacement. Do not attempt to use instrument at all if voltage reading cannot be set up to mark.

If voltage is satisfactory, continue with the next steps of preliminary adjustment as follows:

- A. Confirm operation of pilot light/meter illuminating lamp.
- B. With sample inlet in fresh air, squeeze bulb several times to flush out any remaining gas.
- C. Check zero setting by turning switch to ON position. Meter should read close to zero. Lift and turn ZERO knob to bring reading to exactly 0.
- D. Couple sampling hose to instrument inlet on left hand end, and connect probe to end of hose. Hold finger over probe to block flow and squeeze bulb. Bulb should remain squeezed while finger blocks inlet.
- E. Admit a sample of some combustible gas to end of probe, and confirm that meter rises upscale.

Instrument is adjusted and ready to use. It may be turned off and carried to the job.

To make a gas test, proceed as follows:

- 1) Turn to VOLT ADJ. position, adjust voltage if necessary, then turn to ON.
- 2) Hold probe within space to be tested. Squeeze bulb several times while watching meter, and observe maximum reading.
- 3) After completion of test, remove probe from test space, flush with fresh air for 4 or 5 squeezes of bulb, and turn off.



Gas Detection For Life

### 3. INTERPRETATION

Meter readings are taken on a scale graduated 0 - 100% LEL. The abbreviation L.E.L. stands for Lower Explosive Limit, and represents the lowest concentration, which can be ignited by a source of ignition, hence the lowest concentration which can produce an explosion. This quantity is also spoken of as the Lower Flammable Limit (L. F. L.).

The model GP-204 is calibrated before shipment to read directly in percent L.E.L. of methane in air, based on the known L.E.L. for methane of 5.0% by volume. That is, a 5.0% by volume will produce a reading of 100%, and smaller concentrations will read in proportion.

Other combustible gases will read in approximate terms of explosibility. For maximum accuracy, the unit should be calibrated to the gas intended to be detected.

Concentrations may also be interpreted in terms of volume percent by multiplying the percent L.E.L. in the sample (determined from the meter reading and the curve) by the published figure for L.E.L. in volume percent, as noted on the curve. The maximum concentration allowable in a space where men are working or where welding operations are carried out is primarily a matter of local regulation and of judgement based on knowledge of conditions. A maximum reading of 10% or 20% is usually allowed. If 20% is selected, this is often spoken of as a factor safety of 5, as the concentration must be increased five times before explosive conditions are reached.

### 4. MAINTENANCE

#### A. Calibration and Adjustment

In addition to the normal operating controls found on the top panel, the following auxiliary controls are available.

##### Calibration Potentiometer

This adjustment is used to set the meter reading to the desired level, while sampling a known concentration or combustible gas. To access this adjustment, the top plate must be removed by taking out the screws in each corner. The calibration potentiometer is a slotted-shaft control located above the right upper corner of meter. Turn clockwise to increase meter reading.

#### B. Sensor replacement

The sensor assembly consists of an active filament and a similar but enclosed reference filament, potted into a flame arrestor. It should be replaced if zero cannot be set within the range of the ZERO ADJ., or if reading cannot be set high enough on a calibration gas sample using calibration potentiometer. To replace:

- 1) Loosen the two panel hold-down screws. Remove and invert top panel.
- 2) With switch off, loosen (do not remove) the three screws holding the terminals for red, black and white wires. Pull wires from terminals.
- 3) Remove the four screws holding the rectangular sensor plate. Pull out sensor and replace with the new one in same position. Check that the gasket is in place on chamber before installation of new sensor. Install wires on terminals as before.
- 4) Turn instrument on and adjust zero.



## Gas Detection For Life

- 5) Recalibrate the new sensor using span gas.

### C. Batteries

The model GP-204 is furnished with two standard size D batteries, either alkaline or Ni-Cad. These batteries will give 4 to 5 hours of operating life before replacement or recharge. When meter cannot be set as high as the "CHECK" line with switch in VOLT ADJ. position and VOLT ADJ. knob all the way clockwise. batteries require replacement or recharging.

To replace batteries, remove instrument from leather case, and loosen the coin slotted captive screw found in center of bottom plate. Remove plate, exposing batteries in their spring contact holders. Pull old batteries out, and install new ones in the same position, observing polarity as marked on holder.

### D. Sample system

#### 1) Hose

The hose used is teflon-lined, synthetic rubber jacketed, and immune to absorption or attack by any combustible vapors or solvents. Keep hose clean and be sure that couplings make air tight contact, checking occasionally by holding finger over hose inlet. Bulb should remain flattened after squeezing if there is no leak. Extension hoses in various lengths are available.

#### 2) Flame arrestor / Sensor assembly

The active filament is installed within a sintered bronze porous metal cup, which acts as a flame arrestor to retain explosions that may occur when sampling explosive gas and air mixtures. The flame arrestor is part of the sensor assembly, which may be removed by taking out the four screws that hold the sensor plate. If the flame arrestor is dusty, wet, oily or corroded, it must be replaced by replacing the sensor assembly. Before reinstalling sensor in instrument, be sure that the reaction chamber cavity and incoming lines are clean and dry.

### E. Meter lamp

The meter lamp is on whenever the instrument is on, and provides illumination to permit meter reading in dark places. If lamp fails, it should be replaced as follows:

Remove four screws holding top plate to the top panel. Take off top plate exposing lamp. Loosen set screws, which lock lamp wires to terminals, and pull lamp out. Install new lamp in the same position.

## 5. PRECAUTIONS AND NOTES ON OPERATION

### A. Heated samples

When sampling spaces such as hot tanks that are warmer than the instrument, remember that condensation can occur as the sample passes through the cool sample line. Water vapor condensed in this way can block the flow system and corrode the flame arrestor. A water trap can be used to control this, and is available as an accessory.

If heated hydrocarbon vapors of the heavier hydrocarbons (flash point 90° F or above) are present, they may also condense in the sample line and fail to reach the filament. Thus an erroneous low reading may be obtained.

### B. Element poisoning



## Gas Detection For Life

Certain substances have the property of desensitizing the catalytic surface of the platinum filament. These substances are termed “catalyst poisons” and can result in reduced sensitivity or in failure to give a reading on samples containing combustible gas. The most commonly encountered catalyst poisons are silicone vapors, and samples containing such vapors even in small proportions should be avoided.

Occasional calibration checks on known gas samples are necessary, especially if the possibility exists of exposure to silicones. A calibration check on a known methane gas concentration is the most dependable as an indication of normal sensitivity. A convenient calibration kit is available and described under “Accessories”.

### C. Rich mixtures

When high concentrations of gas are sampled, especially those above the considerable heat is liberated at the filament. This heat may cause damage to the filament or tend to shorten its life, so sustained testing of samples beyond the meter range should be avoided. When sampling rich mixtures, the following instrument action may be expected:

- 1) Mixtures up to 100% L.E.L. reading on scale.
- 2) Mixtures between L.E.L. and Upper Explosion Limit (U.E.L.) readings at top of meter.
- 3) Mixtures above U.E.L. - As sampling continues the meter first goes to top of scale, then comes back down on scale, depending upon concentration.
- 4) Oxygen deficient mixtures

Samples which do not have the normal proportion of oxygen may tend to read low, if there is not enough oxygen to react with all combustible gas present in the sample. As a general rule, samples containing 10% oxygen or more have enough oxygen to give a full reading on any combustible gas sample up to the L.E.L.

### 5) Oxygen - Enrich mixtures

Sample having more than the normal proportion of oxygen will give a normal reading. However, they should be avoided because the flame arrestor used is not dense enough to arrest flames from combustible gas in oxygen, which can be much more intense than those in air. **DO NOT ATTEMPT TO USE THE MODEL GP-204 ON SAMPLES OF COMBUSTIBLE GAS IN OXYGEN.**

Instruments for measurement of oxygen concentration are available from RKI Instruments Inc.

## 6. ACCESSORIES

### A. Extension hoses

Additional lengths of hose may be used for sampling from deep tanks and manholes. The polyurethane hoses are satisfactory for most samples including natural gas, hydrogen, propane, and gasoline vapors.

### B. Water trap (Option)

Where there is danger of water being drawn into the instrument, a water trap should be used. This glass bodied trap with sintered metal filter couples to indicator inlet and will collect water that is drawn into or condensed in the sample hose. Inspect trap periodically while in use, and empty or clean



bowl and filter whenever visible water or dust accumulate. Regular sample hoses connect to inlet of trap when it is installed on instrument.

## 7. PARTS LIST

The following parts are considered as normal repair or replacement items (Option) and may be ordered separately, by description and number. Always specify model and serial number of instrument for which parts and accessories are required. For problems with parts not listed, write RKI Instruments Inc. for information or request shipping instructions for return or the instrument for repair.

<b><u>Part Number</u></b>	<b><u>Description</u></b>
30-0401RK	Aspirator bulb
49-1140RK	Battery, size D, Alkaline
49-1240RK	Battery, size D, Ni-Cad
62-0110RK	Sensor / flame arrestor assembly
80-0150RK	Sampling probe, 10", plastic
80-0001RK	Hose, 1 m teflon-lined, complete with couplings
80-0002RK	Hose, 2 m teflon-lined, complete with couplings
80-0007RK-10	Hose, 10 ft. polyurethane, complete with couplings
80-0007RK-15	Hose, 15 ft. polyurethane, complete with couplings
80-0007RK-20	Hose, 20 ft. polyurethane, complete with couplings
80-0007RK-30	Hose, 30 ft. polyurethane, complete with couplings
0-0220RK	Water trap
81-GP204	Cal Kit for GP-204, 2.5% Methane in Air



## Product Warranty

RKI Instruments, Inc. warrants gas alarm equipment sold by us to be free from defects in materials, workmanship, and performance for a period of one year\* from the date of shipment from RKI Instruments, Inc. Any parts found defective within that period will be repaired or replaced, at our option, free of charge. Parts must be returned to RKI Instruments, Inc. for repair or replacement. This warranty does not apply to those items which by their nature are subject to deterioration or consumption in normal service, and which must be cleaned, repaired or replaced on a routine basis.

Examples of such items are:

- a) Pump diaphragms and valves
- b) Fuses
- c) Batteries
- d) Filter elements

Warranty is voided by abuse including mechanical damage, alteration, rough handling, or repair procedures not in accordance with instruction manual. This warranty indicates the full extent of our liability, and we are not responsible for removal or replacement costs, local repair costs, transportation costs, or contingent expenses incurred without our prior approval.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF RKI INSTRUMENTS, INC. INCLUDING BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL RKI INSTRUMENTS, INC. BE LIABLE FOR INDIRECT, INCIDENTAL OR CONSEQUENTIAL LOSS OR DAMAGE OF ANY KIND CONNECTED WITH THE USE OF ITS PRODUCTS OR FAILURE OF ITS PRODUCTS TO FUNCTION OR OPERATE PROPERLY.

This warranty covers instruments and parts sold to users only by authorized distributors, dealers and representatives as appointed by RKI Instruments, Inc.

We do not assume indemnification for any accident or damage caused by the operation of this gas monitor and our warranty is limited to the replacement of parts or our complete goods. Warranty covers parts and labor performed at RKI Instruments, Inc. only, and does not cover field labor or shipment of parts back to RKI.

\* The Models GX-2001 and GasWatch 2 carry a two year warranty. The two year warranty applies to the instrument including original sensors. Replacement parts and sensors have a standard one year warranty.