61-1003RK/61-0190RK
Combustible Gas Detector
Operator's Manual

Part Number: 71-0120RK

Revision: 0

Released: 2/11/11

WARNING

Read and understand this instruction manual before operating detector. Improper use of the detector could result in bodily harm or death.

Periodic calibration and maintenance of the detector is essential for proper operation and correct readings. Please calibrate and maintain this detector regularly! Frequency of calibration depends upon the type of use you have and the sensor types. Typical calibration frequencies for most applications are between 6 and 12 months, but can be required more often or less often based on your usage.

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 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. 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) Absorbent cartridges

b) Pump diaphragms and valves

c) Fuses

d) Batteries

e) Filter elements

Warranty is voided by abuse including mechanical damage, alteration, rough handling, or repair procedures not in accordance with the operator's 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 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.

Table of Contents

Overview

This manual describes the 61-1003RK combustible gas detector. This manual also describes how to install, start up, maintain, and calibrate the detector when used with a gas monitoring controller. A parts list at the end of this manual lists replacement parts and accessories for the combustible gas detector.

The 61-1003RK combustible gas detector includes a junction box. This manual may also be used for the 61-0190RK combustible gas detector which does not include a junction box and is normally mounted in one of a controller's conduit hubs. If you are using a 61-0190RK combustible gas detector, disregard all references to the junction box and junction box terminal block.

Specifications

Table 1 lists specifications for the combustible gas detector.

Table 1: 61-1003RK Specifications

Target / Calibration Gas	**With Junction Box** 61-1003RK-CH4: Methane 61-1003RK-HC: Propane **Without Junction Box** 61-0190RK-CH4: Methane 61-0190RK-HC: Propane
Area Classification	Explosionproof for Class I, Groups B, C, and D
Sampling Method	Diffusion
Detection Range	0 to 100% LEL
Response Time	90% in 45 seconds
Accuracy	± 5% of reading or ± 2% of full scale (whichever is greater)

WARNING: ***When using the 61-1003RK/61-0190RK, you must follow the instructions and warnings in this manual to assure proper and safe operation of the 61-1003RK/61-0190RK and to minimize the risk of personal injury. Be sure to maintain and periodically calibrate the 61-1003RK/61-0190RK as described in this manual.***

Description

The 61-1003RK combustible gas detector has two versions, the 61-1003RK-CH4 which is calibrated to methane and the 61-1003RK-HC which is calibrated to propane. The detector is an infrared type of detector which has some advantages over a catalytic type of combustible detector. The infrared detector will generally have a longer service life than a catalytic detector, it will require calibration less often, and it can detect combustible gas even if there is no oxygen in the sample which allows detection of combustible gas in an inert atmosphere.

This section describes the components of the 61-1003RK. They include the infrared LEL detector and the junction box.

Infrared LEL Detector

The infrared LEL detector is made up of a miniature infrared combustible gas LEL detector housed and encapsulated in a pipe nipple. The pipe nipple has 3/4 inch NPT threads on each end and a 1-1/4 inch hex that allows removal or installation of the detector with a wrench. A porous flame arrestor coated with a hydrophobic film that repels liquids is on one end of the detector and allows sample gas to enter the detector. Four color coded leads, red, white, green, and black, extend from the other end of the detector. The leads allow you to connect the detector to the terminal block in the junction box.

To distinguish the propane detector from the methane detector (in case the replacement detector label that is applied to one of the leads is lost), a short length of red shrink tubing is applied to the white wire of the propane detector near where the wire comes out of the nipple.

Junction Box

The junction box allows you to install the detector at a mounting site that is remote from a controller and it protects the detector wiring connections. Two 3/4" NPT conduit hubs allow you to mount the detector to the junction box and connect the wiring from the detector to a controller. The terminal block within the junction box facilitates the wiring to the detector. A cover on the front of the junction box allows access to the interior of the junction box. Three spacers installed on the back of the junction box control the distance of the junction box from a mounting surface and insure that there is enough room to install a calibration cup on the detector during calibration.

Installation

This section describes procedures to mount the combustible gas detector in the monitoring environment and wire it to a controller.

Mounting the Combustible Gas Detector

1. Select a mounting site that is representative of the monitoring environment. Consider the following when you select the mounting site.
   - Select a site where the detector is not likely to be bumped or disturbed. Make sure there is sufficient room to perform start-up, maintenance, and calibration procedures.
   - Select a site where the target gas is likely to be found first. For lighter gases, mount the detector near the ceiling; for heavier gases, mount the detector near the floor.

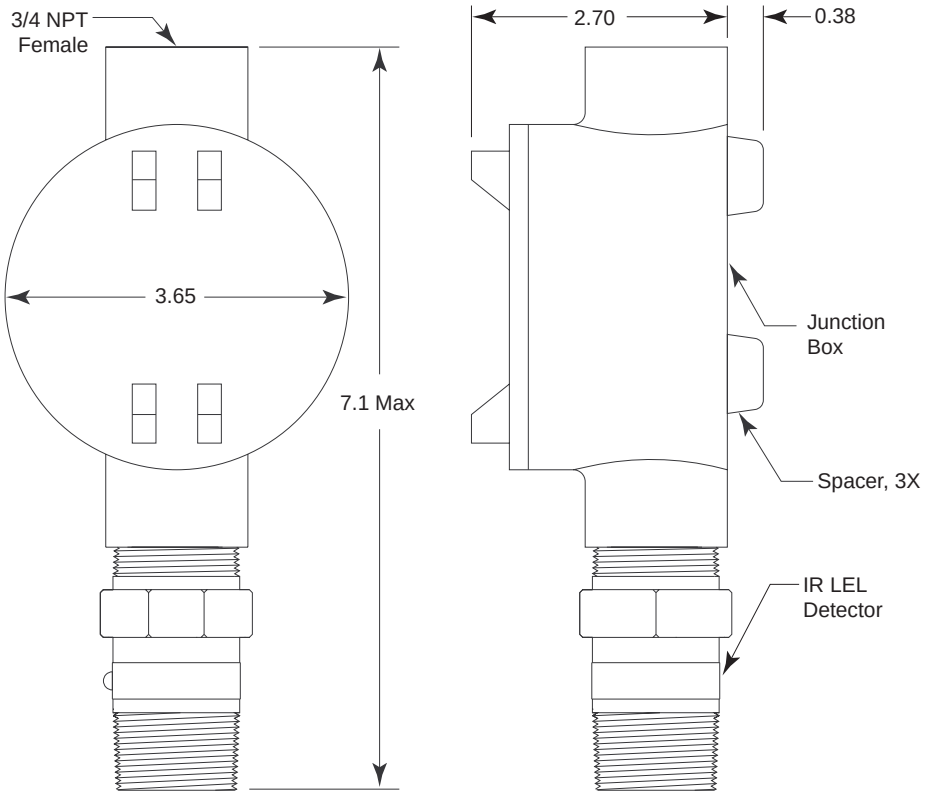

Figure 1: Mounting the Combustible Gas Detector

2. At the mounting site you select, hang or mount the junction box with the detector facing down (see Figure 1).

Wiring the Combustible Gas Detector to a Controller

WARNING: Always verify that the power to the controller is off before you make wiring connections.

1. Turn off the controller.

2. Turn off or unplug power to the controller.
3. Remove the cover from the junction box. If the detector is already installed in the junction box, go to step 6.
4. Guide the detector leads through the bottom conduit hub of the junction box, then screw the mounting threads of the detector into the conduit hub.
5. Connect the detector leads to the terminal block in the junction box.
6. Guide a four-conductor, shielded cable or four wires in conduit through the top conduit hub of the junction box. Connect the wires to the terminals opposite the detector leads.

CAUTION: *Leave the shield drain wire insulated and disconnected at the 61-1003RK. You will connect the opposite end of the cable's drain wire at the controller.*

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7. Secure the junction box cover to the junction box.
8. Route the cable or wires in conduit leading from the detector through one of the conduit hubs at the controller.

CAUTION: *Do not route power and detector wiring through the same conduit hub. The power cable may disrupt the transmission of the detector signal to the controller.*

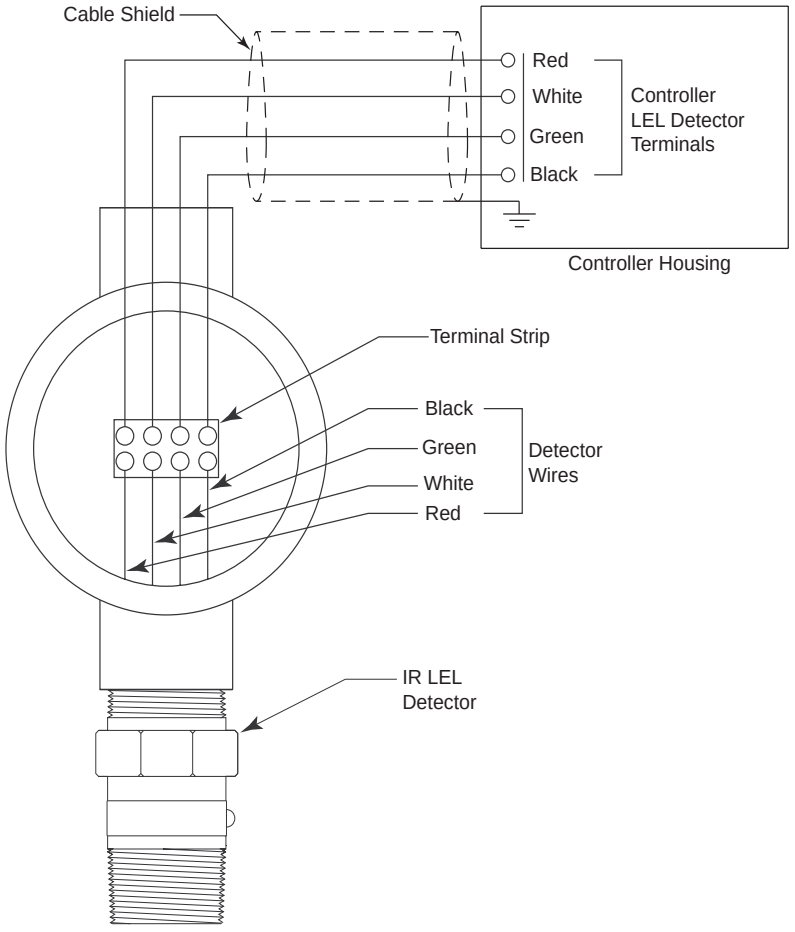

Figure 2: Wiring the Combustible Gas Detector to a Controller

Start Up

This section describes procedures to start up the combustible gas detector and place the detector into normal operation.

Introducing Incoming Power

1. Complete the installation procedures described earlier in this manual.
2. Verify that the power wiring to the controller is correct and secure. Refer to the controller operator's manual.
3. Turn on or plug in power to the controller, then turn on the controller.
4. Verify that the controller is on and operating properly. Refer to the controller operator's manual.

CAUTION: *Allow the detector to warm up for 5 minutes before you continue with the next section, "Setting the Zero Reading".*

Setting the Zero Reading

CAUTION: *If you suspect the presence of combustible gas in the monitoring environment, use a zero air calibration cylinder to introduce "fresh air" to the detector and verify an accurate zero reading.*

1. Verify that the detector is in a fresh air environment (environment known to be free of combustible and toxic gases and of normal oxygen content, 20.9%).
2. Verify a reading of 0% LEL at the controller.

   If the display reading is 0% LEL, start up is complete. The combustible detector is in normal operation. If the display reading is not 0% LEL, continue with step 3.
3. Perform a zeroing operation at the controller. See the controller operator's manual for directions.

Maintenance

This section describes maintenance procedures. It includes preventive maintenance, troubleshooting, and component replacement procedures.

Preventive Maintenance

This section describes a preventive maintenance schedule to ensure the optimum performance of the combustible gas detector. It includes daily, monthly, and biannual procedures.

Daily

Verify a display reading of 0% LEL at the controller. Investigate significant changes in the reading.

Monthly

This procedure describes a test to verify that the combustible gas detector responds properly to the target gas.

WARNING: ***The controller is not an active gas monitoring device during the response test procedure.***

NOTE: Performing a response test on the combustible detector may cause alarms. Be sure to put the controller into its calibration program or disable external alarms before performing this test

NOTE: The following procedure assumes the use of a calibration kit which includes a calibration gas cylinder, a 0.5 LPM fixed flow regulator with an on / off knob, a calibration cup for the detector, and a short piece of sample tubing to connect the regulator to the calibration cup.

1. Place the controller into its calibration program or disable external alarms.
2. Verify that the controller display reading is 0% LEL.

   If the controller reading is not 0% LEL, set the zero reading then continue this procedure. See the controller instruction manual for directions to set the zero reading.
3. Screw the calibration cup onto the detector.
4. Use the sample tubing to connect the regulator to the calibration cup.
5. Screw the regulator into the calibration cylinder.
6. Turn the on / off knob on the regulator counterclockwise to open the regulator.
7. Apply gas to the detector for one minute.
8. Verify that the reading is within ± 20% of the gas concentration.

NOTE: If the reading is not within ± 20% of the gas concentration, calibrate the detector as described in “Calibration” on page 8.

9. Turn the on / off knob clockwise to close the regulator.

10. Unscrew the regulator from the calibration cylinder.
11. Unscrew the calibration cup from the detector.
12. When the display reading falls below the alarm setpoints, return the controller to normal operation or enable external alarms.
13. Store the components of the calibration kit in a safe place.

Biannually

Calibrate the detector every six months as described in “Calibration” on page 8.

Troubleshooting

The troubleshooting guide describes symptoms, probable causes, and recommended action for problems you may encounter with the combustible gas detector.

NOTE: This troubleshooting guide describes detector problems only. See the controller operator’s manual for problems you may encounter with the controller.

Table 2:Troubleshooting the Combustible Gas Detector

Condition	Symptom(s)	Probable Causes	Recommended Action
Fail Condition	• Controller indicates a fail condition.	• The detector wiring is disconnected or misconnected. • The detector zero signal is low enough to cause a fail condition. • The detector is malfunctioning.	1. Verify that the detector wiring is correct and secure. 2. Calibrate the detector. 3. If the fail condition continues, replace the detector. 4. If the fail condition continues, contact RKI for further instruction.
Slow or No Response/ Difficult or Unable to Calibrate	• Detector responds slowly or does not respond to response test. • Unable to accurately set the zero or response reading during calibration. • Detector requires frequent calibration. ***Note:*** *Under “normal” circumstances, the detector requires calibration once every six months.* *Some applications may require a more frequent calibration schedule.*	• The calibration cylinder is low, out-dated, or defective. • The detector is malfunctioning.	1. Verify that the calibration cylinder contains an adequate supply of a fresh test sample. 2. If the calibration/response difficulties continue, replace the detector. 3. If the calibration/response difficulties continue, contact RKI for further instruction.

Replacing the IR LEL Detector

1. Turn off the controller.
2. Turn off power to the controller.
3. Remove the junction box cover.
4. Disconnect the detector leads from the terminal block inside the junction box. Note the position of the color-coded leads as you remove them.

5. Unscrew the detector from the junction box.
6. Guide the detector leads of the replacement detector through the bottom conduit hub of the junction box, then screw the mounting threads of the detector into the conduit hub.
7. Connect the detector leads to the terminal block in the same position as the leads you removed in step 4.
8. Secure the junction box cover to the junction box.
9. Turn on power to the controller.
10. Turn on the controller.
11. Calibrate the replacement detector as described in“Calibration” on page 8.

Calibration Frequency

Although there is no particular calibration frequency that is correct for all applications, a calibration frequency of every 6 months is adequate for most infrared combustible detector applications. Unless experience in a particular application dictates otherwise, RKI Instruments, Inc. recommends a calibration frequency of every 6 months for the infrared combustible detector.

If an application is not very demanding, for example detection in a clean, temperature controlled environment where the combustible target gas is not normally present, and calibration adjustments are minimal at calibration, then a calibration frequency of every 9 to 12 months is adequate.

If an application is very demanding, for example if the environment is not well controlled, then more frequent calibration than every 6 months may be necessary.

Calibration

This section describes how to calibrate the combustible gas detector. It includes procedures to assemble the calibration kit, set the zero reading, set the response reading and return to normal operation.

WARNING: ***The controller is not an active gas monitoring device during the calibration procedure.***

NOTE: The following procedure assumes the use of a calibration kit which includes a calibration gas cylinder, a 0.5 LPM fixed flow regulator with an on / off knob, a calibration cup for the detector, and a short piece of sample tubing to connect the regulator to the calibration cup.

Assembling the Calibration Kit

1. Screw the calibration cup onto the detector.
2. Use the sample tubing to connect the regulator to the calibration cup.
3. Place the controller into its calibration program or disable external alarms.

NOTE: Calibrating the combustible detector may cause alarms. Be sure to put the controller into its calibration program or disable external alarms before continuing.

Setting the Zero Reading

CAUTION: *If you suspect the monitoring environment is not free of combustible vapors, use the calibration kit and a zero air calibration cylinder to introduce "fresh air" to the detector and verify an accurate zero setting*

1. Verify that the detector is in a fresh air environment.
2. Follow the directions in the controller's operator's manual for setting the zero reading.

Setting the Response Reading

1. Follow the directions in the controller's operator's manual for setting the response reading (span).
2. When the directions call for exposing the detector to gas, screw the regulator into the cylinder, turn the on / off knob counterclockwise to open the regulator, and allow the gas to flow to the detector for 1 minute before continuing with the directions.
3. After setting the response reading, turn the on / off knob clockwise to close the regulator, unscrew the regulator from the cylinder and remove the calibration cup from the detector.
4. Allow the reading at the controller to decrease below the alarm points before returning the controller to normal operation or enabling external alarms.

NOTE: If you do not allow the gas reading decrease below the alarm points, then unwanted alarms may occur.

5. Verify that the controller display reading decreases and stabilizes at 0%LEL.
6. Store the components of the calibration kit in a safe and convenient place.

Parts List

Table 3 lists replacement parts and accessories for the 61-1003RK combustible gas detector.

Table 3: Parts List

Part Number	Description
18-0400RK-01	Junction box with spacers
61-0190RK-CH4	Methane infrared LEL detector
61-0190RK-HC	HC infrared LEL detector (calibrated to propane)
71-0120RK	*61-1003RK/61-0190RK Combustible Gas Detector Operator's Manual* (this document)
81-0004RK-01	Calibration cylinder (50% LEL Propane in air, 34 liter)
81-0012RK-01	Calibration cylinder (50% LEL Methane in air, 34 liter)
81-0076RK-01	Zero air calibration cylinder (34 liter)
81-1050RK	Regulator, 0.5 liter / minute, with gauge and knob, for 17- and 34-liter calibration cylinders
81-1103RK	Calibration cup