65-2511RK/65-2512RK
Oxygen Detector
Operator's Manual

Part Number: 71-0109RK

Revision A

Released: 12/14/05

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.

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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 65-2512RK oxygen 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 oxygen detector.

The 65-2512RK oxygen detector includes a junction box. This manual may also be used for the 65-2511RK oxygen 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 65-2511RK oxygen detector, disregard all references to the junction box and junction box terminal strip.

Specifications

Table 1 lists specifications for the oxygen detector.

Table 1: 65-2511RK/65-2512RK Specifications

Target Gas	Oxygen
Sampling Method	Diffusion
Detection Range	0 - 25.0% oxygen
Response Time	90% in 30 seconds
Operating Temperature	-20° C to 45° C
Output	Millivolt (mV)

Description

This section describes the oxygen detector and the junction box.

Oxygen Detector

The detector's sensing element along with signal conditioning components are encapsulated within a conduit mounting black anodized aluminum housing. The sensing element used is a capillary type that is not susceptible to output changes with changes in atmospheric pressure.Through a series of chemical and electronic reactions, the detector produces a millivolt output that is proportional to the detection range. 3/4" NPT mounting threads at the top of the detector allow you to mount the detector to the junction box or a 3/4" NPT conduit fitting. Two color-coded leads extend from the top of the detector. The leads allow you to connect the detector to a controller.

Junction Box

The junction box allows you to install the oxygen detector at a mounting site that is remote from a controller, and it protects the detector wiring connections. Two conduit hubs allow you to mount the oxygen detector to the junction box and connect the wiring from the detector to a controller. 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.

A terminal block within the junction box facilitates the wiring process. A cover on the front of the junction box allows access to the interior of the junction box.

Installation

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

Mounting the Oxygen Detector

NOTE: If you are mounting a 65-2511RK, it does not include a junction box and is usually factory installed in one of a controller's conduit hubs or may be field installed using the 3/4" NPT threads on the end with the wires. The 65-2512RK includes a junction box as shown in Figure 1 below.

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 that is at normal breathing level.

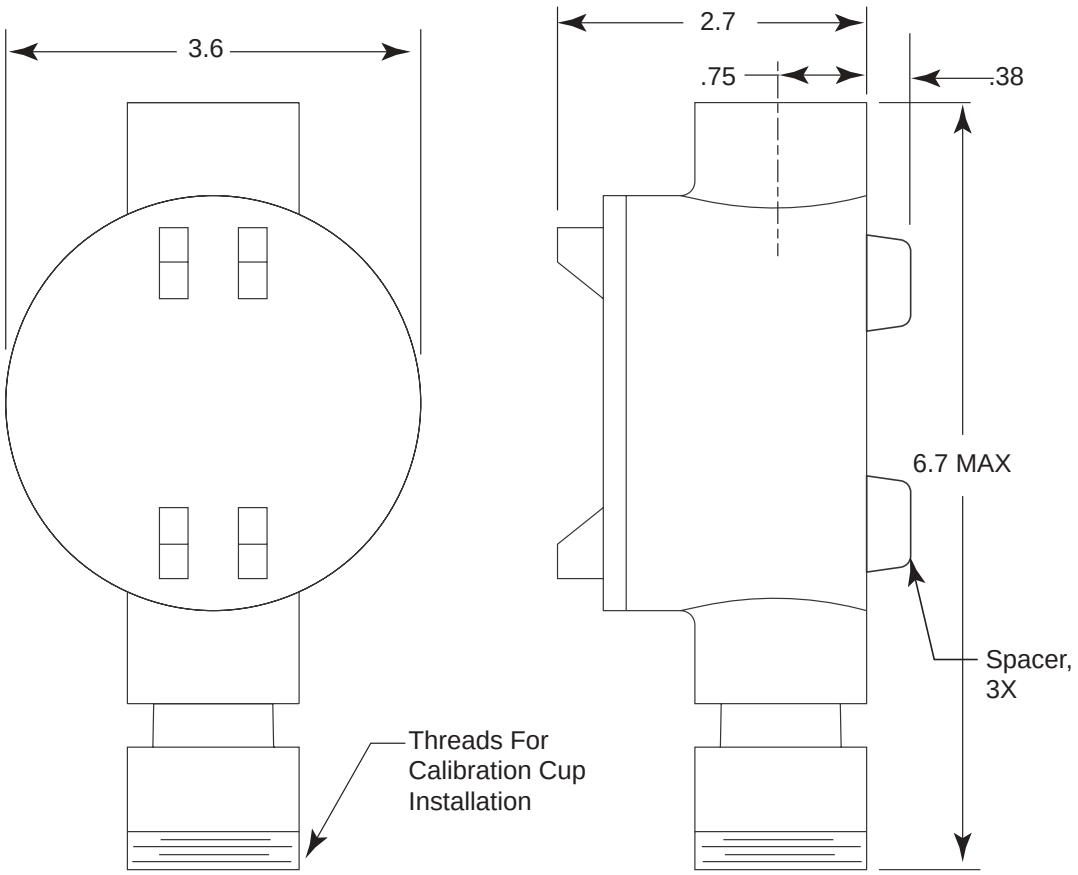

Figure 1: Mounting the Oxygen Detector

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

Wiring the Oxygen 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 incoming power.
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 two-conductor, shielded cable or two wires in conduit through the top conduit hub of the junction box. Use appropriate conduit fittings.
7. Connect the wires to the terminals opposite the detector leads.

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

8. Secure the junction box cover to the junction box.
9. Route the cable or wires in conduit leading from the detector through one of the conduit hubs at the controller. Use appropriate conduit fittings.
10. Connect the wires to the appropriate controller detector terminal strip. See the controller operator's manual for wiring instructions.

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.*

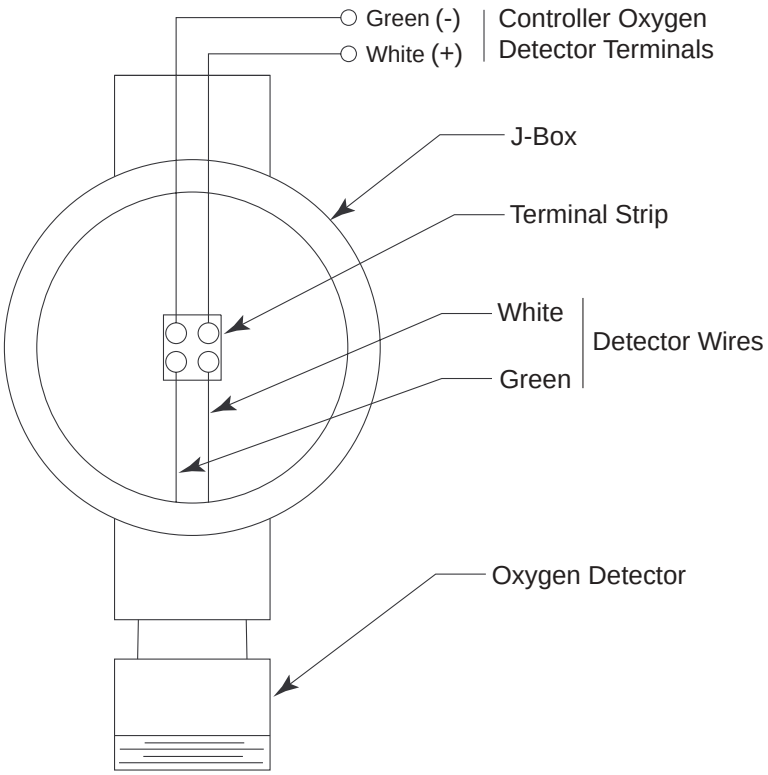

Figure 2: Wiring the Oxygen Detector to a Controller

Start Up

This section describes procedures to start up the oxygen 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 instruction manual.
3. Turn on or plug in the incoming power, 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 Fresh Air Reading."*

Setting the Fresh Air Reading

CAUTION: *If you suspect that the monitoring environment is not a fresh air environment, use the zero air calibration cylinder to introduce "fresh air" to the detector and verify an accurate fresh air reading.*

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

   If the display reading is 20.9% oxygen, start up is complete. The oxygen detector is in normal operation. If the display reading is not 20.9% oxygen, continue with step 3.
3. Perform a fresh air adjustment operation at the controller. See the controller operator's manual for instructions.

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 oxygen detector. It includes daily, monthly, and quarterly procedures.

Daily

Verify a display reading of 20.9% oxygen at the controller. Investigate significant changes in the reading.

Monthly

This procedure describes a test to verify that the oxygen detector responds properly to oxygen deficiency.

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

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

1. Place the controller into its calibration program or disable external alarms.
2. Verify that the controller display reading is 20.9% oxygen.

   If the controller reading is not 20.9% oxygen, set the fresh air reading, then continue this procedure. See the controller operator's manual for instructions to set the fresh air reading.
3. Exhale into the bottom of the oxygen detector housing.
4. Stop exhaling into the bottom of the detector, then verify that the reading on the controller display decreased from the normal reading of 20.9% oxygen.

NOTE: If the reading does not decrease, calibrate the detector as described in the Calibration section of this Manual.

5. When the display reading rises above the decreasing alarm setpoint, return the controller to normal operation.

Quarterly

Calibrate the detector as described in the Calibration section of this manual. See the calibration frequency discussion in the Calibration section to determine if a quarterly calibration schedule fits your needs.

Troubleshooting

The troubleshooting guide describes symptoms, probable causes, and recommended action for problems you may encounter with the oxygen 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 Oxygen Detector

Condition	Symptom(s)	Probable Causes	Recommended Action
Fail Condition	• Controller indicates a fail condition.	• The detector wiring is disconnected or misconnected. • 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 fresh air or zero reading during calibration. • Detector requires frequent calibration. ***Note:*** *Under "normal" circumstances, the detector requires calibration once every three 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 Oxygen 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 and tighten firmly.
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 the Calibration section of this manual.

Calibration

This section describes how to calibrate the oxygen detector. It includes procedures to assemble the calibration kit, set the fresh air reading, set the zero reading and return to normal operation. It describes calibration using a fixed flow regulator which has no on / off knob and allows sample to flow as soon as it is screwed into a cylinder. RKI Instruments, Inc. recommends using a 0.5 LPM (liters per minute) fixed flow regulator.

Calibration Frequency

Although there is no particular calibration frequency that is correct for all applications, a calibration frequency of every 3 to 6 months is adequate for most applications. Unless experience in a particular application dictates otherwise, RKI Instruments, Inc. recommends a calibration frequency of every 3 months (quarterly).

If an application is not very demanding, for example detection in a clean, temperature controlled environment, and calibration adjustments are minimal at calibration, then a calibration frequency of every 6 months is adequate.

If an application is very demanding, for example if the environment is not well controlled, then more frequent calibration than every 3 months may be necessary.

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

Setting the Fresh Air Reading

CAUTION: *If you suspect the monitoring environment is not of normal oxygen content, 20.9%, use the calibration kit and a zero air calibration cylinder to introduce "fresh air" to the detector and verify an accurate fresh air setting.*

1. Place the controller into its calibration program or disable external alarms.

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

2. Verify that the detector is in a fresh air environment.
3. Follow the directions in the controller's instruction manual for setting the fresh air reading to 20.9% oxygen.

Setting the Zero Reading

1. Screw the calibration cup onto the bottom of the oxygen detector.
2. Use the sample tubing to connect the regulator to the calibration cup.

NOTE: Do not screw the regulator into the calibration cylinder at this time.

3. Follow the instructions in the controller's operator's manual for setting the oxygen zero reading.
4. When the instructions call for exposing the detector to gas, normally 100% nitrogen, screw the regulator into the cylinder and allow the gas to flow to the detector for 2 minutes before continuing with the instructions. The detector signal should be stable after two minutes.
5. After setting the zero reading, unscrew the regulator from the cylinder and remove the calibration cup from the detector.

NOTE: For convenience, leave the components of the calibration kit connected by the sample tubing.

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6. When the display reading rises above the decreasing alarm setpoint, return the controller to normal operation.

NOTE: If you do not allow the oxygen reading to increase above the decreasing alarm point, then unwanted alarms may occur.

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7. Verify that the controller display reading increases and stabilizes at 20.9% oxygen.
8. Store the components of the calibration kit in a safe and convenient place.

Parts List

Table 3 lists replacement parts and accessories for the oxygen detector.

Table 3: Parts List

Part Number	Description
06-1248RK	Sample tubing (3/16 in. x 5/16 in.; specify length when ordering)
18-0400RK-01	Junction box with spacers
65-2511RK	Oxygen detector, conduit-mounting, capillary type, not including junction box
65-2512RK	Oxygen detector including junction box.
71-0109RK	*65-2511RK/65-2512RK Oxygen Detector Operator's Manual* (this document)
81-F301RK-LV	Calibration kit (34 liter)
81-0076RK-01	Zero air calibration cylinder (34 liter)
81-0078RK	Calibration cylinder (100% nitrogen, 17-liter)
81-0078RK-01	Calibration cylinder (100% nitrogen; 34-liter)
81-1003RK	Regulator, 0.5 liter/minute; continuous flow (for 17- and 34-liter calibration cylinders)
81-1117RK	Calibration cup