35-3000RK-LEL/O
Sample-Draw Detector
Operator's Manual

Part Number: 71-0223RK

Revision: P1

Released: 2/28/11

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 3 and 6 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.

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Overview

This operator's manual describes the 35-3000RK-LEL/O sample-draw detector. This manual also describes how to install, start up, maintain, and calibrate the sample-draw detector when using it with a gas monitoring controller. A parts list at the end of this manual lists replacement parts and accessories for the sample-draw detector.

Specifications

Table 1 lists specifications for the sample-draw detector. See the controller operator's manual for information specific to the controller.

Table 1: Specifications

Target Gas	Combustible gas, methane calibration standard Oxygen
Input Power	24 VDC Nominal (23 VDC - 28 VDC)
Construction (housing)	Fiberglass/polyester (NEMA 4X)
Dimensions	8.5 in. H x 6.5 in. W x 4.25 in. D
Weight	4.5 lbs.
Sampling Method	Sample-draw
Sample Flow	1.5 SCFH (nominal)
Detection Range	Combustible gas: 0 to 100% LEL Oxygen: 0 to 25% volume
Response Time	90% in 30 seconds
Accuracy	Combustible Gas: ± 5% of reading or ± 2% LEL (whichever is greater) Oxygen: ± 0.5% O_2

WARNING: ***When using the 35-3000RK-LEL/O, you must follow the instructions and warnings in this manual to assure proper and safe operation of the 35-3000RK-LEL/O and to minimize the risk of personal injury. Be sure to maintain and periodically calibrate the 35-3000RK-LEL/O as described in this manual.***

Description

This section describes the components of the sample-draw detector. The sample-draw detector consists of the housing, flow system, and detection system.

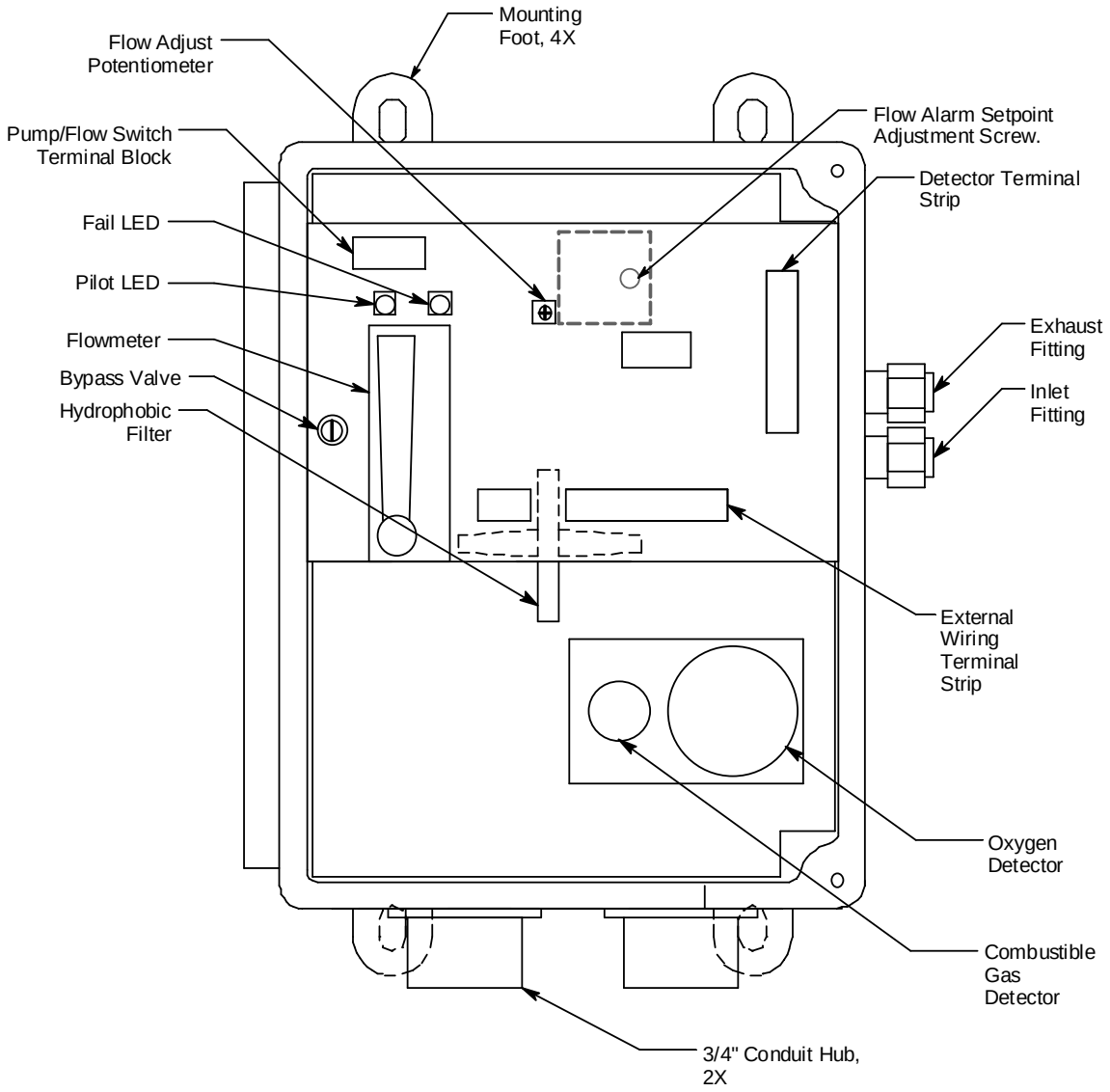


Figure 1: Sample-Draw Detector Component Location

Housing

The sample-draw detector's fiberglass housing is weather- and corrosion-resistant. It is suitable for installation where general purpose equipment is in use.

The housing door is hinged on the left side and is secured by two latches on the right side. The flowmeter and status lights are visible through a window in the housing door.

Four mounting feet are attached to the back of the housing (one at each corner). Use the mounting feet to install the housing to a vertical surface. Use the two conduit hubs on the bottom of the housing to make wiring connections to a gas monitoring controller.

An aluminum subpanel is mounted to the interior of the housing. The sample-draw detector's internal components are mounted to the subpanel.

Flow System

The sample-draw detector's flow system consists of the INLET fitting, hydrophobic filter, pump, flowmeter, bypass valve, status lights, pressure switch, flow block, and EXHAUST fitting (see Figure 1). Figure 2 illustrates how the gas sample moves through the flow system.

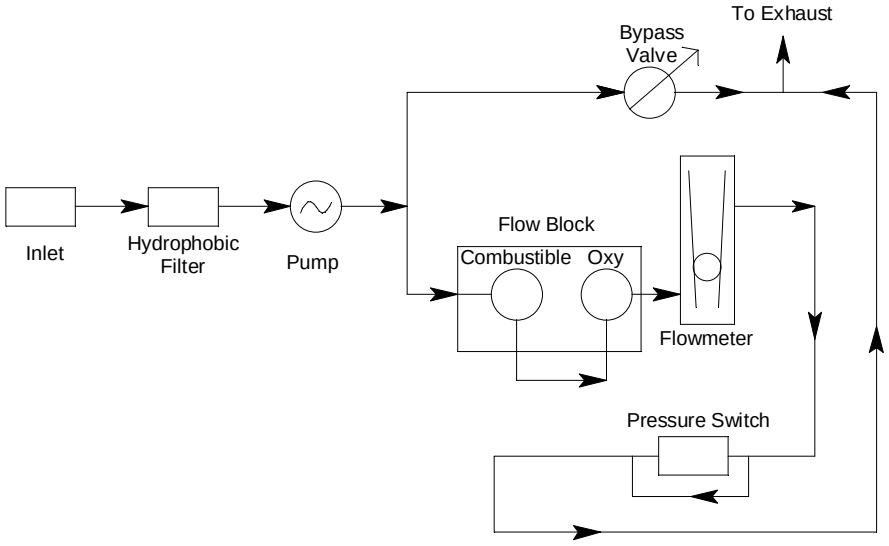


Figure 2: Sample-Draw Detector Flow Diagram

INLET Fitting

The INLET fitting on the right side of the housing allows the gas sample to enter the sample-draw detector. The INLET fitting accepts 1/4 in. rigid tubing. See the Installation section on page 7 to connect tubing to the INLET fitting.

Hydrophobic Filter

The hydrophobic filter is below the main circuit board. The filter prevents particulates and water in the incoming gas sample from damaging the flow and detection systems. Replace the filter when it appears dirty, discolored, or clogged.

Pump

The pump is behind the main circuit board near the top of the sample-draw detector. The pump pulls the gas sample into the sample-draw detector. The pump operates on 24 VAC, which is generated from the 24 VDC supplied by the controller.

Flowmeter

The flowmeter is attached to the main circuit board near the top left corner (see Figure 1). You can see it through the window in the door. A ball in the flowmeter column indicates the flow rate of the sample-draw detector. The flowmeter measures the flow in the range 0.2 to 2.0 SCFH (Standard Cubic Feet per Hour). The optimum flow rate is 1.5 SCFH.

Bypass Valve

The bypass valve is to the left of the flowmeter. The bypass valve adjusts the flow rate to the detector. Use a flat-blade screwdriver to adjust the bypass valve.

NOTE: The bypass valve allows fine adjustments of the flow rate. For a wider range of adjustment, use the flow adjust potentiometer (see Figure 1).

Status Lights

Two status lights are above the flowmeter. They are also visible through the window in the housing door.

Pilot light

The green Pilot light is on when the sample-draw detector is receiving power from the controller.

Fail light

The red Fail light is on when the sample flow rate is below the low flow level.

NOTE: The factory set low flow level is 0.6 SCFH (±0.2). See "Adjusting the Low Flow Setting" on page 15 to adjust this setting.

Pressure Switch

The pressure switch is mounted to the opposite side of the main circuit board. The pressure switch monitors the flow rate of the incoming gas sample.

If the flow rate falls below the preset low flow level, the pressure switch causes the fail relay to interrupt the signal from the combustible gas detector. The interrupted detector signal causes a fail condition at the controller on the combustible channel. The low flow level is factory-set at 0.6 SCFH (±0.2 SCFH).

NOTE: There is no low flow alarm for the oxygen sensor.

Flow Block

The flow block is located in the lower right corner of the sample-draw detector. Both sensors are installed in the flow block. The flow block routes the sampled air to each sensor.

EXHAUST Fitting

The EXHAUST fitting on the right side of the housing allows the gas sample to exit the sample-draw detector. The EXHAUST fitting accepts 1/4 in. rigid tubing. See the Installation section on page 7 to connect tubing to the EXHAUST fitting.

Detection System

The detection system consists of the combustible gas sensor , the oxygen sensor, and the main circuit board.

Combustible Gas Sensor

The combustible gas sensor is installed in the flow block. The combustible gas sensor includes the sensing elements, flame arrestor, connector, and sensor leads.

Sensing elements

Two sensing elements are protected within the sensor assembly. Through a series of thermal and electronic reactions, these elements produce an electrical output that is proportional to the detection range of the sample-draw detector.

Flame arrestor

The porous flame arrestor allows the gas sample to enter the sensor assembly and contact the sensing elements. The flame arrestor also contains any sparks that may occur within the sensor.

Connector

The top of the sensor includes five pins that plug into the socket connector. This connector allows you to replace the sensor without disconnecting the wiring. The sensor leads are soldered to the connector.

Sensor leads

Four color-coded leads extend from the connector. The leads allow you to connect the combustible gas sensor to the main circuit board.

Oxygen Sensor

The oxygen sensor is installed in the flow block to the right of the combustible gas sensor. The oxygen sensor includes the oxygen cell, connector, and sensor leads.

Oxygen cell

The oxygen cell is protected within the sensor assembly. Through a series of chemical and electronic reactions, the cell produces a millivolt output that is proportional to the detection range of the sample-draw detector.

Connector

The cable that extends from the sensor terminates in a 7-position socket that connects to a mating 7-pin male connector. The socket and connector allow you to replace the sensor without disconnecting the wiring. The sensor leads are soldered to the male connector.

Sensor leads

Two color-coded leads extend from the connector. The leads allow you to connect the oxygen sensor to the main circuit board.

Main Circuit Board

The main circuit board includes the interconnect terminal strip, detector terminal strip, pump terminal strip, and relay (see Figure 1).

NOTE: The flowmeter and status lights are mounted to the main circuit board but are considered part of the flow system.

Interconnect terminal strip

The interconnect terminal strip is the nine-point terminal strip near the bottom edge of the main circuit board. Use the interconnect terminal strip to connect the sample-draw detector to a controller.

Detector terminal strip

The detector terminal strip is the nine-point terminal strip near the right edge of the circuit board. Use the detector terminal strip to connect the combustible gas sensor and the oxygen sensor to the main circuit board.

NOTE: The combustible gas sensor and oxygen sensor are factory-wired to the circuit board. See the “Installation” section on page 7 for all wiring procedures related to the sample-draw detector.

Pump terminal strip

The pump terminal strip is the four-point terminal strip near the top edge of the circuit board. Use the pump terminal strip to connect the pump and pressure switch to the main circuit board.

NOTE: The pump and pressure switch are factory-wired to the circuit board. See "Installation" on page 7 for all wiring procedures related to the sample-draw detector.

Relay

The relay is to the left of the detector terminal strip. The relay is single-pole, double-throw (SPDT) and is rated for 2 amps at 25 VDC (resistive). If the pressure switch senses a low flow condition, the relay interrupts the signal from the combustible gas sensor. The interrupted sensor signal causes a fail condition at the controller for the combustible gas channel.

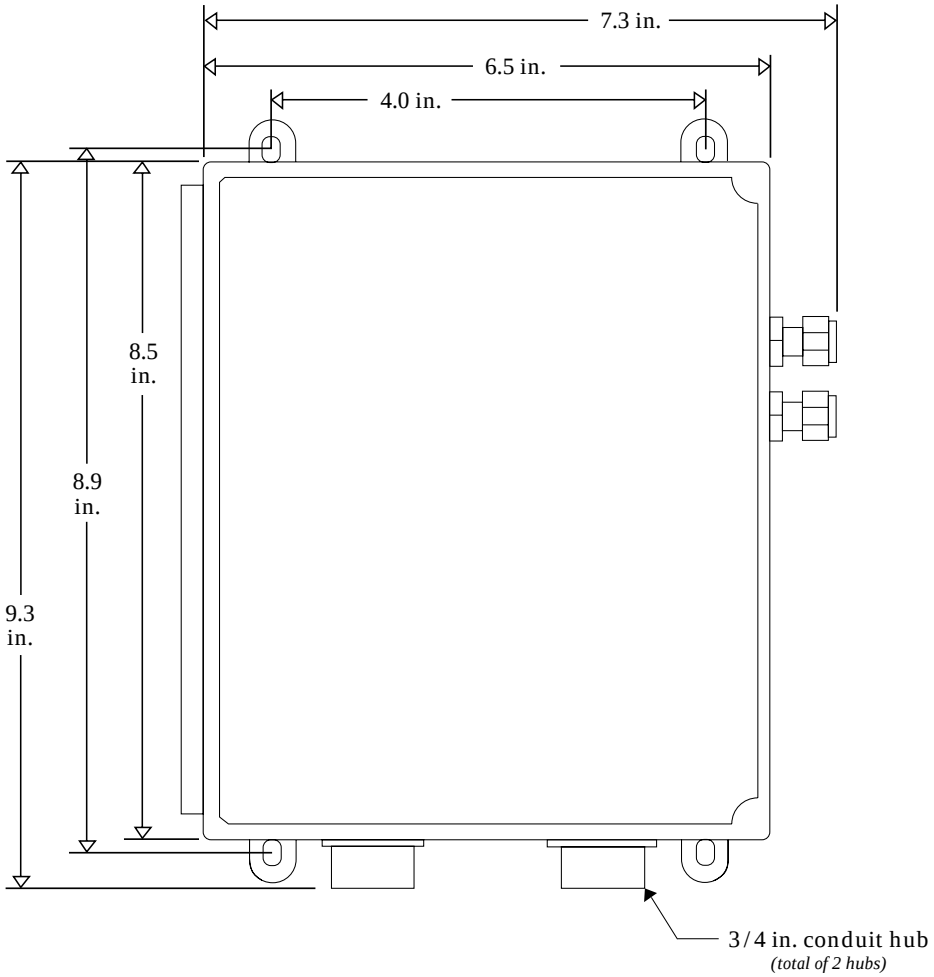
WARNING: ***The relay will not interrupt the signal from the oxygen sensor so the oxygen channel at the controller will not indicate a fail condition in the event of low flow.***

Installation

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

Mounting the Sample-Draw Detector

1. Select the mounting site. Consider the following when you select the mounting site.
   - Is there enough room to open the housing door and make wiring connections at the bottom of the housing and tubing connections at the right of the housing?
   - Make sure there is sufficient room to perform start-up, maintenance, and calibration procedures.
   - Are the flowmeter and status lights visible?



Note: The housing is 4.25 in. deep.

Figure 3: Mounting the Sample-Draw Detector

4. Close and latch the housing door.

NOTE: The sample-draw detector is shipped with the mounting feet "tucked under" the housing to protect the mounting feet during shipment.

5. Slightly loosen the screw that secures the mounting foot to the housing, then rotate the mounting foot 180 degrees (see Figure 3).
6. Tighten the screw that secures the mounting foot to the housing.
7. Repeat steps 3 and 4 for the remaining three mounting feet.
8. Position the sample-draw housing on a vertical surface at eye level (4 1/2 to 5 feet from the floor).
9. Insert 1/4 inch or 5/16 inch screws through the slots in the mounting feet to secure the housing to the mounting surface.

Connecting the Sample Lines to the Sample-Draw Detector

1. Attach 1/4 in. metal or rigid plastic sample tubing to the INLET fitting. Brass tubing is recommended for most applications. If tubing corrosion caused by the air being sampled is a concern, stainless steel tubing or rigid polypropylene tubing may be used.

CAUTION: *If you use **flexible** sample tubing (polyurethane for example), use an appropriate metal insert to seal the connection between the tubing and the INLET fitting. See the Parts List at the end of this manual, for an example of an appropriate metal insert.*

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2. Place the opposite end of the tubing at the sampling area.

CAUTION: *Avoid loops or slumps in the incoming sample line. To reduce response time, keep the incoming sample line as short as possible.*

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3. Attach rigid sample tubing to the EXHAUST fitting.
4. Route the opposite end of the tubing to an open area where the sample can safely disperse.

Wiring the Sample-Draw Detector to a Controller

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

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1. Turn off the controller.
2. Turn off power to the controller.
3. Unlatch and open the housing door of the sample-draw detector.
4. Guide an eight-conductor, shielded cable or eight wires in conduit through one of the conduit hubs at the bottom of the sample-draw housing.
5. Connect the cable to the sample-draw detector's interconnect terminal strip as shown in Figure 4.
6. Close and latch the housing door of the sample-draw detector.

CAUTION: *If using shielded cable, leave the cable shield's drain wire insulated and disconnected at the sample-draw detector. You will connect the opposite end of the drain wire at the controller.*

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7. Route the cable or wires in conduit leading from the sample-draw detector through one of the conduit hubs at the controller.

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

8. Connect the wires to the applicable detector terminal strip and power terminals at the controller as shown in Figure 4. See the 35-3000RK-LEL / O detector head specification sheet for your controller for the specific wiring connections to the controller.

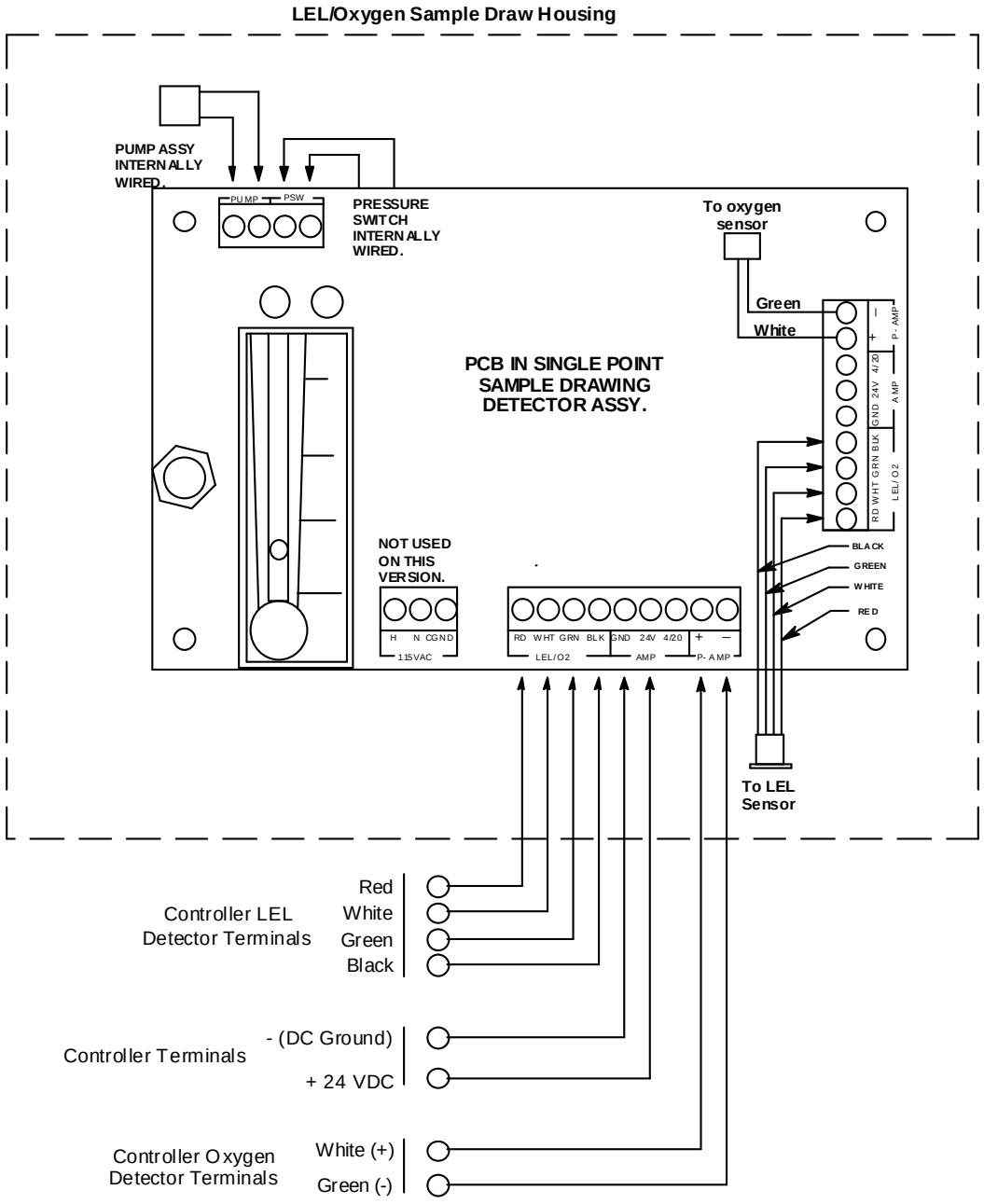

Figure 4: Wiring the Sample-Draw Detector to a Controller

5. If shielded cable is used, connect the cable's drain wire to an available chassis (earth) ground at the controller. RKI controllers typically have a ground stud that can be used to ground the cable's drain wire.

Start Up

This section describes procedures to start up the sample-draw detector and place the sample-draw detector into normal operation.

Introducing Incoming Power

1. Complete the installation procedures described earlier in this manual.
2. Verify that the wiring is correct and secure. Refer to the controller operator's manual for connections at the controller.
3. Turn on or plug in the power to the controller, then turn on the controller.
4. Verify that the sample-draw detector's PILOT light is on.
5. Verify that the controller is on and operating properly. Refer to the controller operator's manual.
6. Verify that the flowmeter indicates a flow rate of approximately 1.5 SCFH. If necessary, use the bypass valve or flow adjust potentiometer to adjust the flow rate.

NOTE: The following step tests for leaks in the sample line. This test will cause a low flow condition at the sample-draw detector and a fail condition at the controller on the combustible gas channel. Be sure to put the controller into its calibration program or disable external alarms before performing this test.

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7. Verify that the incoming sample line is not leaking. To test the sample line, plug the open end of the sample line with your thumb. If the flowmeter ball drops to the bottom of the flowmeter, the incoming sample line is not leaking.
8. Remove your thumb from the sample line and verify that the flowmeter returns to a normal flow rate.
9. Enable alarms or place the controller in normal operation.

CAUTION: *Allow the sample-draw detector to warm up for 15 minutes before you continue with the next section, "Setting the Zero/Fresh Air Reading".*

Setting the Zero/Fresh Air Reading

CAUTION: *If you suspect the presence of combustible gas or an abnormal oxygen concentration in the monitoring environment, use the calibration kit and the zero air calibration cylinder to introduce "fresh air" to the sensor and verify an accurate zero setting. See the Calibration section of this manual for instructions on using a zero air calibration cylinder for setting the zero reading.*

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1. Verify that the sample-draw detector is sampling a fresh air environment (environment known to be free of combustible gas and of normal oxygen concentration, 20.9%).
2. Verify a reading of 0 %LEL for the combustible channel and 20.9% for the oxygen channel on the controller display screen for the applicable channel.

   If the display reading is 0 % LEL for the combustible channel and 20.9% for the oxygen channel, start up is complete. The sample-draw detector is in normal operation. If the display reading is not 0 % LEL for the combustible channel or 20.9%

for the oxygen channel, continue with step 3.

3. Perform a zero operation at the controller. See the controller operator's manual for instructions to perform a zero operation.

Maintenance

This section describes maintenance procedures. It includes preventive maintenance procedures. This section also includes procedures to troubleshoot the sample-draw detector, replace components of the sample-draw detector, and adjust the low flow setting.

Preventive Maintenance

This section describes a preventive maintenance schedule to ensure the optimum performance of the sample-draw detector. It includes daily, monthly, and quarterly procedures.

Monthly Visual Checks

1. Verify that the pilot light is on.
2. Verify that the flowmeter indicates a flow rate of approximately 1.5 SCFH. If necessary use the bypass valve or flow adjust potentiometer to adjust the flow rate to 1.5 SCFH.
3. Verify a display reading of 0 %LEL for the combustible channel and 20.9% for the oxygen channel at the controller. Investigate significant changes in the display reading.

Monthly Response Test

This procedure describes a test to verify that the sample-draw detector responds properly to the target gas.

NOTE: To reduce the response time of this test, use a short incoming sample line. If the sample-draw detector's sample line is long, connect a shorter line for this test. Make sure you reconnect the sample line after you complete this procedure.

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

Preparing for the response test

NOTE: This procedure describes the RKI calibration kit that includes a demand flow regulator.

1. Verify that the display reading at the controller is 0 % LEL for the combustible channel and 20.9% for the oxygen channel.

   If the display reading is not 0 % LEL for the combustible channel or 20.9% for the oxygen channel, set the zero reading as described in the Calibration section, then continue this procedure.

Performing the response test

1. Screw the demand flow regulator into the combustible gas calibration cylinder.
2. Connect the calibration tubing from the regulator to the INLET fitting. Gas will begin to flow.
3. After approximately one minute, verify that the reading at the controller stabilizes within ± 20% of the concentration of the test sample. If the reading is not within ± 20% of the test sample, calibrate the sample-draw detector as described in the Calibration section.
4. Remove the calibration tubing from the INLET fitting.
5. Store the calibration kit in a safe place.
6. Exhale into the sample-draw detector's INLET fitting.
7. Stop exhaling into the sample line, then verify that the readings at the controller decreased.
8. If the reading does not decrease, calibrate the sample draw detector as described in the Calibration section.
9. Reconnect the incoming sample line to the INLET fitting.

Quarterly Calibration

Calibrate the sample-draw detector as described in the Calibration section.

Troubleshooting

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

NOTE: This troubleshooting guide describes sample-draw detector problems only. See the controller operator's manual if the controller exhibits any problems.

Fail Condition

Symptoms

- The sample-draw detector's Fail light is on.
- The monitoring device is operating properly but indicates a reading well below zero.

Probable causes

- The sample-draw detector's flow rate is too low because of an obstructed sample line, failed pump, etc.
- The sample-draw detector is malfunctioning.
- The sensor wiring is disconnected or misconnected.

Recommended action

1. At the sample-draw detector, set the correct flow rate with the bypass valve or flow adjust potentiometer.
2. If you cannot set the correct flow rate, check the sample lines for obstructions or kinks.
3. Verify that the sensor wiring is correct and secure. "Wiring the Sample-Draw Detector to a Controller" on page 8 describes sensor wiring connections.
4. Calibrate the sample-draw detector as described in the Calibration section.
5. If the fail condition continues, replace the sensors as described later in this section.

6. If the fail condition continues, contact RKI Instruments, Inc. for further instruction.

Slow or No Response/Difficult or Unable to Calibrate

Symptoms

- The sensors respond slowly or do not respond during the monthly response test.
- Unable to accurately set the zero or response reading during the calibration procedure.
- The sensors require frequent calibration.

Probable causes

- The calibration cylinder is low, out-dated, or defective.
- If a demand flow regulator calibration kit is used, the demand flow regulator is not functioning properly.
- The sample-draw detector's flow rate is too low because of an obstructed sample line, failed pump, etc.
- The sample-draw detector is malfunctioning.

Recommended action

1. Verify that the calibration cylinder contains an adequate supply of a fresh test sample.
2. If a demand flow regulator calibration kit is used, use a different demand flow regulator to determine if the original one is functioning properly.
3. If necessary, set the correct flow rate with the bypass valve or flow adjust potentiometer.
4. If you cannot set the correct flow rate, check the sample line for obstructions or kinks.
5. If the calibration / response difficulties continue, replace the sensors as described later in this section.
6. If the calibration / response difficulties continue, contact RKI Instruments, Inc. for further instruction.

Replacing Components of the Sample-Draw Detector

This section includes procedures to replace the sensors, hydrophobic filter, and ferrules.

Replacing the Combustible Gas Sensor

1. Turn off the controller
2. Turn off power to the controller.
3. Open the housing door of the sample-draw detector.
4. Unscrew and remove the two screws that secure the sensor retaining plate, then lift the plate, connector, and sensor out of the housing.
5. Unplug the connector from the sensor.
6. Verify that you are using the correct replacement sensor (NC-6240 is printed on the sensor), then plug the sensor into the connector.
7. Place the sensor in the combustible gas sensor cavity, then position the retaining plate on the two standoffs.
8. Secure the retaining plate to the standoffs with the two screws you removed in step 4.
9. Close and latch the housing door.
10. Turn on power to the controller.

11. Turn on the controller.

CAUTION: *Allow the replacement sensor to warm up for 15 minutes before you continue.*

12. Calibrate the replacement sensor as described in "Calibration, Combustible Sensor" on page 16.

Replacing the Oxygen Sensor

1. Turn off the controller.
2. Turn off power to the controller.
3. Open the housing door of the sample-draw detector.
4. Unscrew and remove the two screws that secure the sensor retaining plate, then lift the plate, connector, and sensor out of the housing.
5. Unplug the connector from the sensor cable socket.
6. Plug the socket of the replacement sensor into the connector.
7. Place the sensor in the oxygen sensor cavity, then position the retaining plate on the two standoffs.
8. Secure the retaining plate to the standoffs with the two screws you removed in step 4.
9. Turn on power to the controller.
10. Turn on the controller.
11. Calibrate the replacement sensor as described in "Calibration, Oxygen Sensor" on page 17.

Replacing the Filter

1. Open the housing door of the sample-draw detector.
2. Disconnect the filter from the rubber elbows on each end of the filter, then remove the filter from the sample-draw detector.
3. Install the new filter.
4. Verify that the flow rate is approximately 1.5 SCFH, then close the housing door.

Replacing the Ferrules

The INLET and EXHAUST fittings each includes two ferrules that seal the inlet or exhaust tubing to the fitting. Replace the ferrules if the seal is bad or if you replace the sample tubing. Always replace the ferrules as a pair.

1. Unscrew the nut that holds the tubing to the fitting from the fitting.
2. Slide the nut away from the end of the tubing.
3. Cut off the end of the sample tube with the old ferrules off about one inch from the end.
4. Slide the nut off the sample tubing.
5. Position the nut so the threaded end is facing you, then insert the bottom (smaller) ferrule into the nut. Insert the ferrule so the flat side is facing down.

NOTE: Make sure the bottom ferrule is laying flat in the nut.

6. Insert the cone-shaped front ferrule on top of the bottom ferrule. Insert the ferrule so the smaller end of the cone is facing up.
7. Screw the nut onto the fitting by hand just until it stops turning.
8. Insert the sample tubing into the fitting until it bottoms out.
9. Firmly tighten the nut so the ferrules crimp onto the sample tubing and make a seal.

Adjusting the Low Flow Setting

NOTE: Adjusting the low flow setting will cause a low flow alarm at the sample-draw detector and a fail alarm at the controller on the combustible channel. Be sure to put the controller into its calibration program or disable external alarms before performing this test.

The factory-set low flow setting is 0.6 SCFH (±0.2). To adjust the low flow setting:

1. Use the flow adjust potentiometer (VR1) to set the flow to 0.6 SCFH.

   If the sample-draw detector goes into low flow alarm before you can adjust the flow down to 0.6 SCFH, adjust the low flow potentiometer 1/4 turn clockwise, then attempt to set the flow again. Repeat this step until you are able to adjust the flow to 0.6 SCFH.

NOTE: The low flow potentiometer is accessible through a circular cutout in the main circuit board. The cutout is labeled PS1.

2. Slowly turn the low flow potentiometer counterclockwise just until the sample-draw detector goes into low flow alarm.
3. Increase the flow using VR1 until the unit is out of low flow alarm.
4. Decrease the flow very slowly and verify that the low flow alarm is 0.6 SCFH (±0.2).

   If the low flow alarm is set too low, turn the low flow potentiometer slightly clockwise. Repeat steps 3 and 4 if necessary.
5. Use the flow adjust potentiometer (VR1) to set the flow to 1.5 SCFH.
6. Make sure the sample-draw detector's Fail light is off.

Calibration Frequency

Although there is no particular calibration frequency that is correct for all sample draw detector 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.

If an application is not very demanding, for example detection in a clean, temperature controlled environment where combustible gases are not normally present 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 combustible gases are present often and in significant concentrations or the environment is not well controlled, then more frequent calibration than every 3 months may be necessary.

Calibration, Combustible Sensor

This section describes how to calibrate the combustible sensor in the sample-draw detector. It includes procedures to prepare for calibration, set the zero reading, set the response reading, and return to normal operation.

The standard calibration gas for the sample-draw detector is methane. The sample-draw detector may be calibrated to other combustible gases such as hexane or hydrogen. Use the correct calibration gas for your installation.

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

NOTE: This procedure describes calibration using a demand flow regulator.

Preparing for Calibration

NOTE: If you can verify a fresh air environment, it is not necessary to use the zero air calibration cylinder to set the zero reading.

1. Follow the instructions in the controller's operator's manual for entering calibration mode.
2. Screw the regulator into a zero air calibration cylinder.

Setting the Zero Reading

1. Connect the sample tubing from the demand flow regulator to the sample-draw detector's inlet line. **This step is not necessary if you verified a fresh air environment earlier in this procedure.**
2. Allow the sample-draw detector to draw sample for one minute.
3. Follow the directions in the controller's operator's manual for setting the zero reading. If you used a zero air calibration cylinder to set the zero reading, proceed to step 4. If you verified a fresh air environment, proceed to the next section, Setting the Response Reading.
4. Disconnect the sample tubing from the inlet line.
5. Unscrew the regulator from the zero air calibration cylinder.

Setting the Response Reading

1. Screw the regulator into the combustible gas calibration cylinder.
2. Connect the sample tubing from the demand flow regulator to the sample-draw detector's inlet line.
3. Allow the sample-draw detector to draw sample for one minute.
4. Follow the directions in the controller's operator's manual for setting the span.
5. Disconnect the sample tubing from the inlet fitting.
6. Unscrew the regulator from the combustible gas calibration cylinder.

Returning to Normal Operation

1. Reconnect the incoming sample line.
2. Wait approximately one minute to allow the combustible gas reading to stabilize.
3. Follow the instructions in the controller's operator's manual to exit the calibration mode.
4. Store the components of the calibration kit in a safe and convenient place.

Calibration, Oxygen Sensor

This section describes how to calibrate the oxygen sensor in the sample-draw detector. It includes procedures to prepare for calibration, set the fresh air reading, set the zero reading, and return to normal operation.

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

NOTE: This procedure describes calibration using a demand flow regulator.

Preparing for Calibration

NOTE: If you can verify a fresh air environment, it is not necessary to use a zero air calibrating sample to set the fresh air reading at the controller.

1. Follow the instructions in the controller's operator's manual for entering calibration mode.
2. Screw the regulator into the zero air calibration cylinder.

Setting the Fresh Air Reading

1. Connect the sample tubing from the demand flow regulator to the sample-draw detector's inlet fitting. **This step is not necessary if you verified a fresh air environment earlier in this procedure.**
2. Allow the sample draw detector to draw sample for one minute.
3. Follow the directions in the controller's operator's manual for setting the fresh air reading.
4. Disconnect the sample tubing from the inlet fitting.
5. Unscrew the regulator from the zero air calibration cylinder.

Setting the Zero Reading

1. Screw the demand flow regulator onto the 100% N_2 calibration cylinder.
2. Connect the sample tubing from the regulator to the inlet line.
3. Allow the sample-draw detector to draw the calibrating sample for 1 minute.
4. Follow the directions in the controller's operator's manual for setting the zero (oxygen free) reading.

5. Disconnect the sample tubing from the sample-draw detector's inlet fitting.
6. Reconnect the incoming sample line to the inlet fitting.
7. Unscrew the regulator from the calibration cylinder.

Returning to Normal Operation

1. Wait 1 to 2 minutes to allow the oxygen reading at the controller to return to normal, then return the controller to normal operation.

NOTE: If you do not allow the oxygen reading to return to normal, then unwanted alarms may occur.

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2. Verify that the controller display reading stabilizes at 20.9%.
3. Store the components of the calibration kit in a safe and convenient place.

Parts List

Table 2 lists replacement parts and accessories for the sample-draw detector.

Table 2: Parts List

Part Number	Description
06-1248RK	Sample tubing, 3/16 x 5/16, specify length, (for calibration kit)
17-2593RK	Brass insert for flexible 1/4 OD x .17 ID tubing (for INLET and EXHAUST fittings)
17-2683RK	Front ferrule (for INLET and EXHAUST fittings)
17-2688RK	Back ferrule (for INLET and EXHAUST fittings)
30-0610RK	Pump
33-0165RK	Hydrophobic filter
61-0145RK	Combustible gas sensor, plug-in type, **LEL** range
65-0601RK	Oxygen sensor (plug-in type)
71-0223RK	Operator's Manual, 35-3000RK-LEL/O Sample-Draw Detector (this document)
81-0002RK-01	Calibration cylinder, 50% LEL hydrogen in air 34 liter)
81-0002RK-03	Calibration cylinder, 50% LEL hydrogen in air, 103 liter
81-0007RK-01	Calibration cylinder, 50% LEL hexane in air, 34 liter
81-0012RK-01	Calibration cylinder, 50% LEL methane in air, 34 liter
81-0012RK-03	Calibration cylinder, 50% LEL methane in air 103 liter)
81-0076RK-01	Zero air calibration cylinder (34 liter)
81-0076RK-03	Zero air calibration cylinder (103 liter)
81-0078RK	Calibration cylinder (100% Nitrogen; 17 liter)
81-0078RK-01	Calibration cylinder (100% Nitrogen; 34 liter)
81-0078RK-03	Calibration cylinder (100% Nitrogen; 103 liter)
81-1054RK	Regulator (demand flow), for 58 and 103 liter steel calibration cylinders
81-1055RK	Regulator (demand flow), for 17 and 34 liter steel calibration cylinders