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INSTRUMENTS

65-2428
Hydrogen Sulfide Detector
Operator's Manual

Part Number: 71-0344

Revision: P1

Released: 10/20/14

www.rkiinstruments.com

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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.

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c) Fuses

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Overview

This manual describes the 65-2428 hydrogen sulfide (H_2S) detector. This manual also describes how to install, start up, maintain, and calibrate the detector when it is used with a gas monitoring controller. A parts list at the end of this manual lists replacement parts and accessories for the H_2S detector.

Specifications

WARNING: ***Do not use this product in a manner not specified in this instruction manual.***

Table 1 lists specifications for the H_2S detector.

Table 1: Specifications

Target Gas	Hydrogen sulfide (H_2S)
Area Classification*	Explosionproof for Class I, Groups B, C, and D
Temperature Code	T6
Installation Category	Installation Category 1. Signal level, special equipment or parts of equipment, telecommunication, electronic, etc., with smaller transient overvoltages than Installation Category (Overvoltage Category) II (ref. IEC 664).
Sampling Method	Diffusion
H2S Detector Signal Output	0.3 mA at 0 ppm H2S nominal 2.5 mA at 100 ppm H2S nominal
Detection Range	0 to 100 PPM (parts per million)
Accuracy	± 5% of reading or ± 2 ppm H_2S (whichever is greater)
Response Time	90% in 30 seconds
Operating Temperature	-40°F to 104°F (-40°C to 40°C)

* *The area classification only applies if the detector is installed using a junction box with an internal volume less than or equal to 69 cubic inches and rated explosion proof for Class I, Groups B, C, and D. The detector is not explosion proof if it is installed in a non-explosion proof enclosure, such as in a conduit hub of a controller like the Beacon 200 or Beacon 800.*

NOTE: The following symbol on the detector label is a caution to the user to refer to this documentation for installation and operation instructions: 

WARNING: ***When using the 65-2428, you must follow the instructions and warnings in this manual to assure proper and safe operation of the 65-2428 and to minimize the risk of personal injury. Be sure to maintain and periodically calibrate the 65-2428 as described in this manual.***

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Description

This section describes the components of the H_2S detector. The detector consists of the detector housing body, housing cap, cap gasket, rubber boot, spacer, and the H_2S sensor.

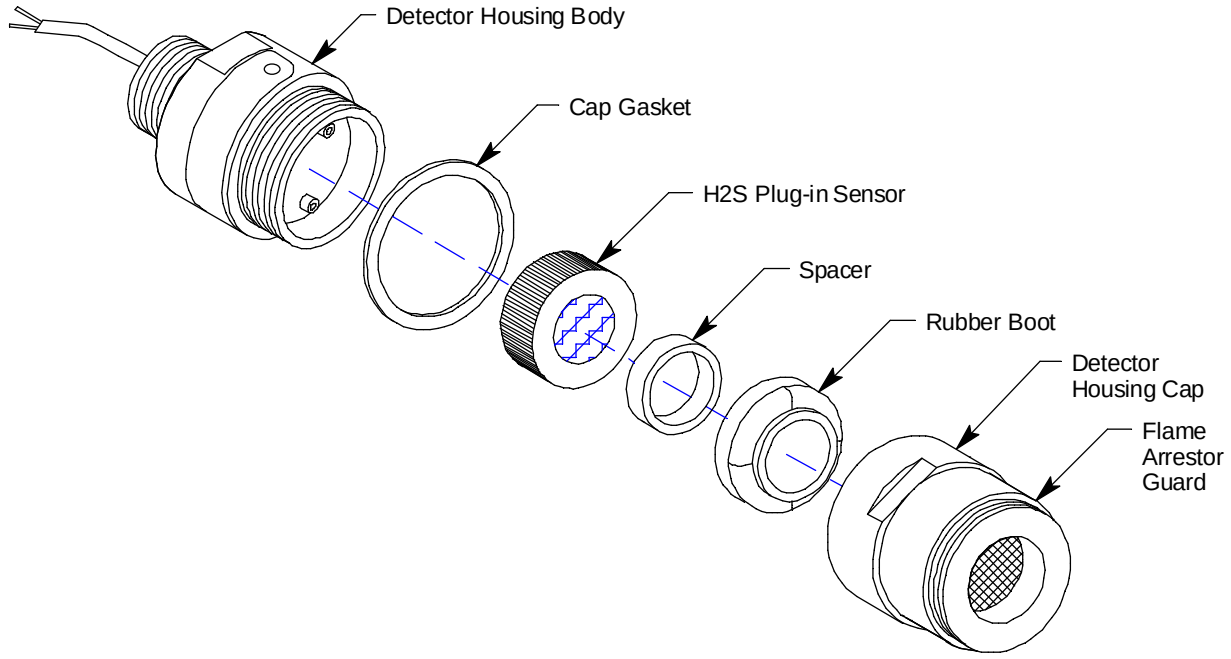


Figure 1: H_2S Detector Component Location

Detector Housing Body, Housing Cap, & Cap Gasket

The detector housing body protects the sensing components within the housing. Use the mounting threads at the top of the housing to screw the H_2S detector into a 3/4" NPT hub. Use the removable cap near the bottom of the housing to access the sensor for maintenance or replacement. The cap protects the sensor from damage and includes a flame arrestor which contains any sparks which may occur within the detector housing. A cap gasket seals the interface between the housing and cap. A flame arrestor guard is permanently bonded to the cap.

Two wires extend from the top of the detector housing. Use these wires to connect the H_2S detector to a controller. The housing includes a four-socket pattern. This socket pattern accepts the sensor's four pins to secure the sensor within the detector housing. A pre-amplifier, located between the sockets and two interconnect wires, conditions the sensor's signal before the signal reaches the controller.

Rubber Boot and Spacer

A rubber boot and spacer are installed between the detector housing cap and the sensor. They help ensure that the detector remains plugged into the detector housing body.

Sensor

The sensor is secured within the sensor housing by four pins. Through a series of chemical and electrical reactions, the sensor produces an electrical output that is proportional to the detection range of the detector.

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Installation

NOTE: Normally, the H_2S detector is shipped already installed in one of the bottom conduit hubs of a controller and factory wired to the controller. If your detector is already installed in a controller, use this section for reference only.

This section describes procedures to mount the H_2S detector in the monitoring environment and wire the detector to a controller.

Mounting the H_2S Detector

1. Whether you will mount the detector directly to a controller or to a junction box, 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.

NOTE: If your application does not require a specific mounting site, mount the detector at approximately breathing level.

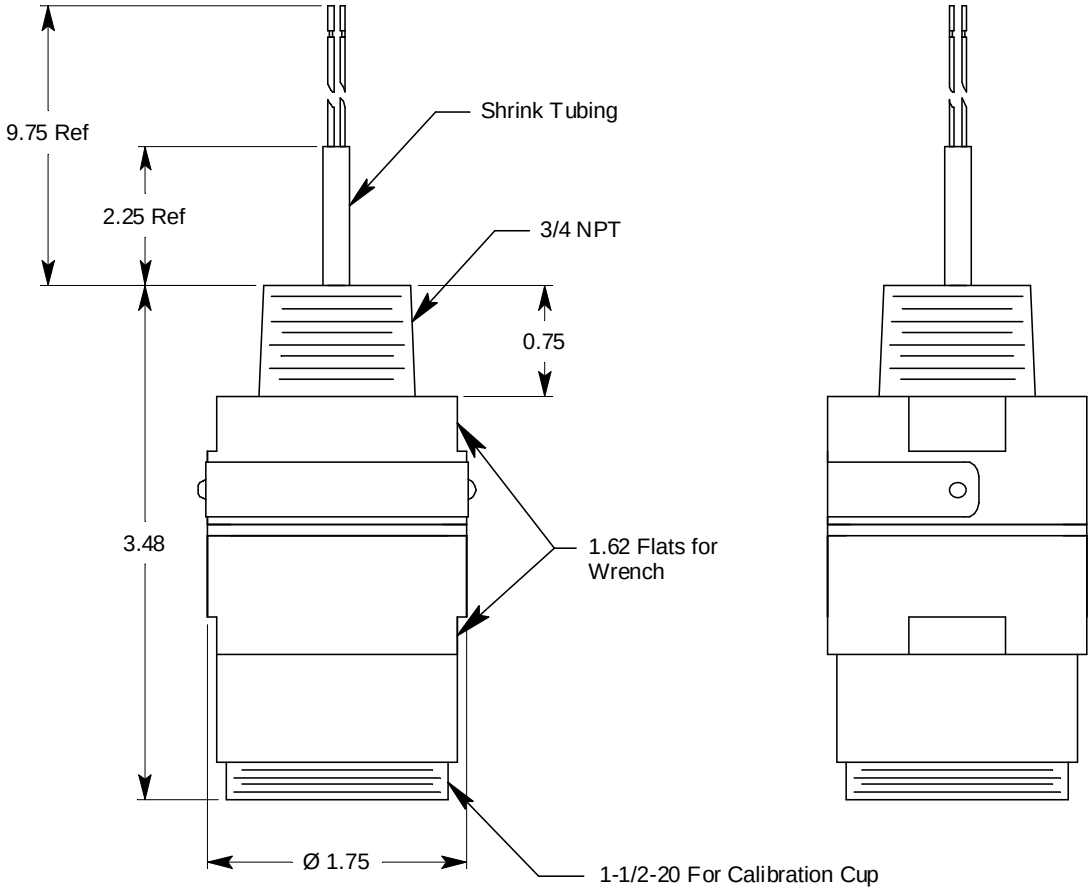


Figure 2: Outline & Mounting Dimensions

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2. At the monitoring site, mount the detector in one of the following two ways:
   - Screw the detector's 3/4" NPT mounting thread into an empty conduit hub on a controller.

     OR
   - Screw the detector's 3/4" NPT mounting thread into an appropriately rated junction box.

CAUTION: *Mount the H_2S detector with the detector facing down (see Figure 2).*

NOTE: If the mounting site requires the detector installation to be explosion proof, you must install the detector in a junction box with an internal volume less than or equal to 69 cubic inches and rated explosion proof for Class I, Groups B, C, and D.

Wiring the H_2S Detector to a Controller

WARNING: ***Always verify that the power source is OFF before you make wiring connections.***

1. Turn off the controller.
2. Turn off or unplug power to the controller.
3. If the detector is mounted remotely from a controller using an explosion proof junction box, proceed to step 4.

   If the detector is mounted directly to a controller, connect the detector's red and black wires to the appropriate controller detector terminals and skip to the Startup Section.
4. Remove the junction box cover.

WARNING: ***To maintain the explosion proof classification of the H_2S detector/junction box combination, a conduit seal must be used within 18 inches of the junction box conduit hub used for wiring to the controller.***

5. Guide a two-conductor, shielded cable or two wires in conduit through an unused conduit hub of the junction box.
6. Connect the two wires to the detector using an appropriate terminal block.

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

7. Secure the junction box cover to the junction box.
8. Route the cable or wires leading from the H_2S detector through one of the conduit hubs at the controller housing.

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.*

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9. Connect the wires to the applicable controller terminal strip. See the controller operator's manual and the controller's detector head specification sheet for the H_2S detector. .

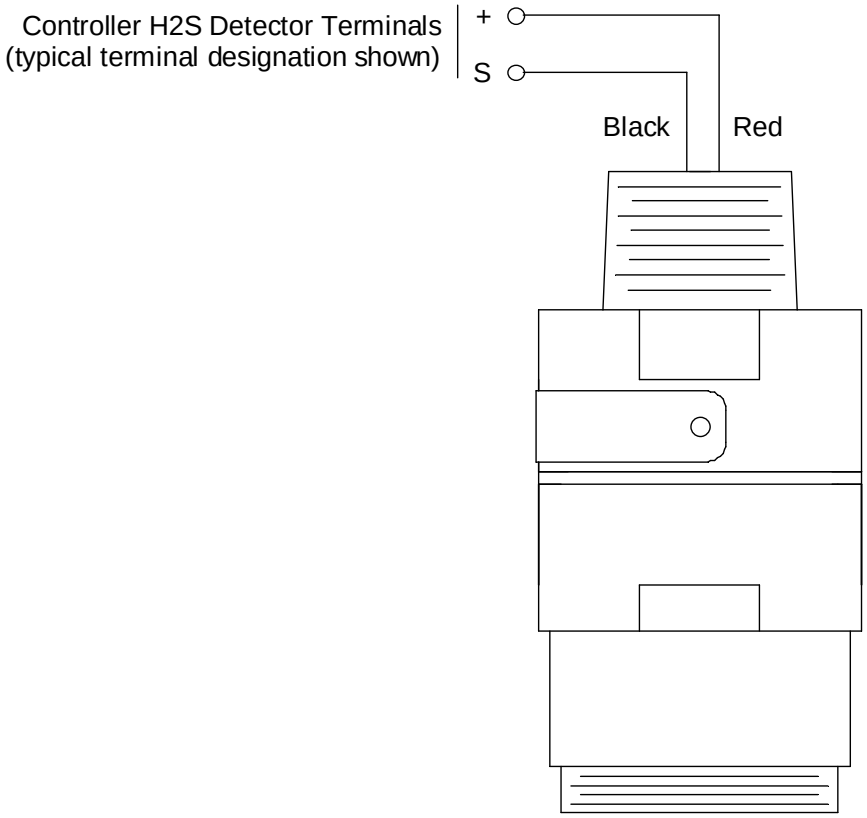


Figure 3: Wiring the H_2S Detector to a Controller

10. 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.
11. Reinstall the junction box cover.

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Start Up

This section describes procedures to start up the H_2S 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 the incoming power at the power source end, 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 Signal".*

Setting the Zero Signal

WARNING: ***If the detector installation is explosion proof, do not remove the sensor cap or junction box cover while the circuits are energized unless the area is determined to be non-hazardous. Keep the sensor cap and junction box cover tightly closed during operation.***

CAUTION: *If you suspect the presence of the target gas 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.*

1. Verify that the detector is in a fresh air environment (environment known to be free of hydrogen sulfide, other toxic and combustible gases, and of normal oxygen content, 20.9%).
2. Verify a reading of 0 ppm H_2S at the controller.

   If the display reading is 0 ppm H_2S, start up is complete. The detector is in normal operation. If the display reading is not 0 ppm H_2S, continue with step 3.
3. Perform a zeroing operation at the controller. See the controller operator's manual for directions.

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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 H_2S detector. It includes daily, monthly, and quarterly procedures.

Daily

Verify a display reading of 0 ppm H_2S at the controller. Investigate significant changes in the display reading.

Monthly

This procedure describes a test to verify that the H_2S detector responds properly to hydrogen sulfide. It describes the test using a calibration kit that includes a calibration cup, calibration gas, sample tubing, and a fixed flow regulator with an on / off knob. RKI Instruments, Inc. recommends using a 0.5 LPM (liters per minute) fixed flow regulator.

NOTE: Performing a response test on the H_2S 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

1. Place the controller into its calibration program or disable external alarms.
2. Verify that the controller display reading for the channel you are testing is 0 ppm.

   If the display reading is not 0 ppm, set the zero reading of the detector as described in the Start Up section of this manual, then continue this procedure.
3. Screw the calibration cup onto the bottom of the H_2S detector.
4. Screw the regulator into the calibration cylinder.
5. Use the sample tubing to connect the regulator to the calibration cup.

Performing the response test

1. Turn the regulator's on / off knob counterclockwise to open the regulator. Gas will begin to flow
2. Allow the gas to flow for two minutes, then verify that the reading is within ± 20% of the cylinder gas concentration.

NOTE: If the reading is not within ± 20% of the correct response reading, calibrate the detector as described in "Calibration" on page 11.

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3. Turn the regulator's on / off knob clockwise to close the regulator.
4. Unscrew the regulator from the calibration cylinder.
5. Unscrew the calibration cup from the H_2S detector.
6. When the controller display reading falls below the alarm setpoints, return the controller to normal operation.

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Quarterly

Calibrate the H_2S detector as described in “Calibration” on page 11.

Troubleshooting

The troubleshooting guide describes symptoms, probable causes, and recommended action for problems you may encounter with the H_2S detector.

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

Fail Condition

Symptoms

- The controller indicates a fail condition.

Probable causes

- The detector wiring is disconnected or misconnected.
- The detector’s zero reading is low enough to cause a fail condition.
- The detector is malfunctioning.

Recommended action

- Verify that the detector wiring is correct and secure.
- Calibrate the detector.
- If the fail condition continues, replace the H_2S sensor as described later in this section.
- If the fail condition continues, contact RKI for further instruction.

Slow or No Response/Difficult or Unable to Calibrate

Symptoms

- The detector responds slowly or does not respond during the monthly response test.
- Unable to accurately set the zero or response reading during the calibration procedure.
- The 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.

Probable causes

- The calibration cylinder is low, out-dated, or defective.
- The detector is malfunctioning.

Recommended action

1. Verify that the calibration cylinder contains an adequate supply of a fresh test sample.
2. If the calibration / response difficulties continue, replace the H_2S sensor as described later in this section.
3. If the calibration / response difficulties continue, contact RKI Instruments, Inc. for further instruction.

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Replacing Components of the H_2S Detector

This section includes a procedure to replace the H_2S sensor and one to replace the entire detector assembly. In most cases, it is not necessary to replace the entire detector assembly.

Replacing the Sensor

CAUTION: *The sensor contains electrolyte which is a dilute acid. Do not disassemble the sensor when replacing it with a new one. If sensor electrolyte comes in contact with your skin, wash affected area thoroughly with soap and water.*

---

1. Turn off the controller.
2. Turn off or unplug power to the controller.
3. Unscrew the detector housing cap from the detector housing.
4. Unplug and remove the H_2S sensor with the rubber boot and spacer attached.
5. Remove the rubber boot and spacer from the old sensor.
6. Install the spacer and rubber boot onto the replacement sensor's face.
7. Carefully plug the replacement sensor into the socket pattern that is located in the detector housing.

NOTE: Match the sensor's male pins with the four female sockets as you plug the sensor into the sockets.

---

8. Screw the detector housing cap onto the top section.
9. Turn on power to the controller.
10. Turn on the controller.

CAUTION: *Allow the replacement sensor to warm up for 5 minutes before you continue with the next step.*

---

11. Calibrate the detector as described in "Calibration" on page 11.

Replacing the H_2S Detector

NOTE: In most cases, it is only necessary to replace the H_2S sensor.

---

1. Turn off the controller.
2. Turn off or unplug incoming power to the controller.
3. If the detector is installed directly on a controller, open the controller door.

   If the detector is installed remotely from a controller in a junction box, remove the junction box cover.
4. If the detector is installed directly on a controller, disconnect the detector leads from the detector terminal strip in the controller. Note the position of the color-coded leads as you remove them.

   If the detector is installed remotely from a controller in a junction box, disconnect the detector leads from the terminal block in the junction box. Note the position of the color-coded leads as you remove them.

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5. Unscrew the detector from the controller conduit hub or junction box hub.
6. Guide the detector leads of the replacement detector through the controller conduit hub or junction box hub then screw the mounting threads of the detector into the hub.
7. If the detector is installed directly on a controller, connect the detector leads to the appropriate detector terminal strip terminals. See the controller operator's manual and the controller's detector head specification sheet for the H_2S detector.

   If the detector is installed remotely from a controller in a junction box, connect the detector leads to the terminal block the same way the old detector was wired. See the controller operator's manual and the controller's detector head specification sheet for the H_2S detector to verify the connections are correct.
8. If the detector is installed remotely from a controller in a junction box, reinstall the junction box cover.
9. Turn on or plug in power to the controller.
10. Turn on the controller.

CAUTION: *Allow the replacement detector to warm up for 5 minutes before you continue with the next step.*

---

11. Calibrate the replacement detector as described in "Calibration" on page 11.

Calibration Frequency

Although there is no particular calibration frequency that is correct for all applications, a calibration frequency of every 3 months is adequate for most H_2S transmitter applications. Unless experience in a particular application dictates otherwise, RKI Instruments, Inc. recommends a calibration frequency of every 3 months for the H_2S transmitter.

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.

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Calibration

This section describes how to calibrate the H_2S detector. It includes procedures to prepare for calibration, set the zero reading, set the response reading, and return to normal operation. It describes calibration using a calibration kit that includes a calibration cup, calibration gas, sample tubing, and a fixed flow regulator with an on/off knob. RKI Instruments, Inc. recommends using a 0.5 LPM (liters per minute) fixed flow regulator.

Preparing for Calibration

1. Screw the calibration cup onto the bottom of the H_2S detector.
2. Screw the regulator into the zero air calibration cylinder.
3. Use the sample tubing to connect the regulator to the calibration cup.

NOTE: If you can verify that the H_2S detector is in a fresh air environment, you do not need to apply zero air to the detector before adjusting the zero reading.

4. Put the controller into its calibration program.

Setting the Zero Reading

1. Follow the directions in the controller operator's manual for setting the zero reading.
2. When the instructions call for applying zero air to the detector, turn the regulator's on/off knob counterclockwise to open it. Gas will begin to flow.
3. Allow the gas to flow for two minutes.
4. Set the zero reading according to the controller operator's manual.
5. Turn the regulator's on/off knob clockwise to close it.
6. Unscrew the regulator from the zero air calibration cylinder. Leave the sample tubing connected to the regulator and the calibration cup.

Setting the Response Reading

1. Screw the regulator into the calibration gas cylinder.
2. Follow the directions in the controller operator's manual for setting the response reading.
3. When the directions call for exposing the detector to gas, turn the regulator's on/off knob counterclockwise to open it. Gas will begin to flow.
4. Allow the gas to flow to the detector for 2 minutes.
5. Set the response reading according to the controller operator's manual.
6. After setting the response reading, unscrew the regulator from the cylinder and remove the calibration cup from the detector.

NOTE: For convenience, leave the regulator and calibration cup connected by the sample tubing.

Returning to Normal Operation

1. Allow about 45 seconds for the gas reading to decrease below the alarm points and then return the controller to normal operation.

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

2. Verify that the controller display reading decreases and stabilizes at 0 ppm H_2S.
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 H_2S detector.

Table 2: Parts List

Part Number	Description
06-1248RK	Sample tubing (order by the foot)
07-0033RK	Detector housing cap gasket
07-0203RK	Rubber retaining boot
14-2101RK	Spacer between sensor and rubber boot
65-2428	H_2S replacement detector assembly (includes sensor)
71-0344	*65-2428 H_2S Detector Operator's Manual* (this document)
81-0076RK	Zero air calibration cylinder, 17 liter steel
81-0076RK-01	Zero air calibration cylinder, 34 liter steel
81-0076RK-03	Zero air calibration cylinder, 103 liter steel
81-0151RK-02	Calibration gas cylinder, 25 ppm H_2S in nitrogen, 58 liter aluminum
81-0151RK-04	Calibration cylinder (25 ppm H_2S in nitrogen; 34 liter aluminum)
81-1050RK	Regulator with gauge and knob, 0.5 LPM, for 17 liter and 34 liter steel calibration cylinders
81-1051RK	Regulator with gauge and knob, 0.5 LPM, for 34AL / 58 / 103 liter calibration cylinders)
81-1117RK	Calibration cup
ES-1537-H2S	H_2S replacement sensor

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