61-1050RK Hydrogen Detector with RM-5000 Series Operator's Manual

Part Number: 71-0457

Revision: P1

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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.

Product Warranty

RKI Instruments, Inc. warranties 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 61-1050RK hydrogen detector. This manual also describes how to install, start up, maintain, and calibrate the detector with an RM-5000. A parts list at the end of this manual lists replacement parts and accessories for the hydrogen detector.

Specifications

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

Table 1 lists specifications for the hydrogen detector.

Single-Case Units: See the Indicator / Alarm Unit RM-5000 Series Operator's Manual for specification and instructions applying to the RM-5000.

Multi-Case Units: See the RM-5000 Series Multi-Unit Case and the Indicator / Alarm Unit RM-5000 Series Operator's Manuals for specifications and instructions applying to the RM-5000.

Table 1: 61-1050RK Specifications

Description	Specifications
Target Gas	Hydrogen
Area Classification	Explosion proof for Class I, Groups B, C, and D
Sampling Method	Diffusion
Detection Range	0 to 2000 ppm (parts per million)
Response Time	90% in 45 seconds

WARNING: ***When using the 61-1050RK, you must follow the instructions and warnings in this manual to assure proper and safe operation of the 61-1050RK and to minimize the risk of personal injury. Be sure to maintain and periodically calibrate the 61-1050RK as described in this manual.***

Description

This section describes the components of the 61-1050RK detector. The 61-1050RK includes the 61-0160RK hydrogen detector and a junction box. A four point terminal strip is provided inside the junction box for detector connections.

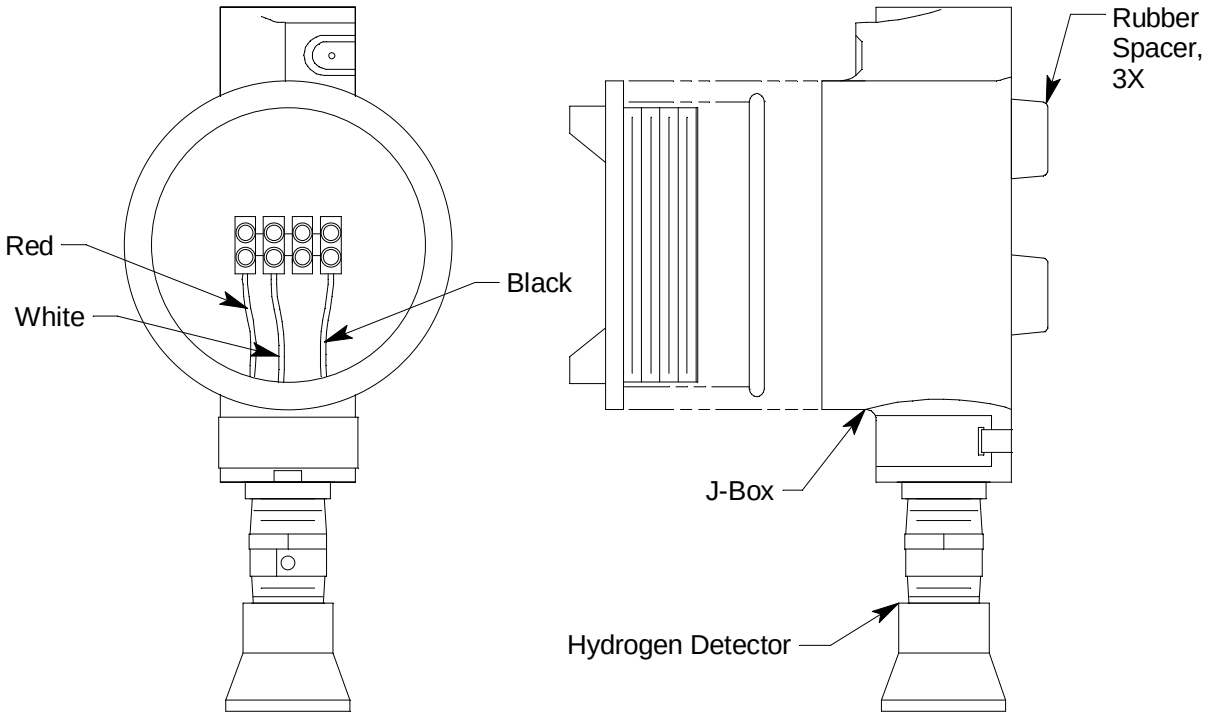

Figure 1: 61-1050RK Component Location

61-1060RK Hydrogen Detector

Two sensing elements are protected within the detector assembly. Through a series of thermal and electronic reactions, these elements produce an electrical output which the RM-5000 converts and displays on its bar graph display.

The sensing elements are packaged in a 1/2 NPT nipple with a sintered metal flame arrestor on one end allowing ambient air to diffuse into the detector. The flame arrestor also contains any sparks which may occur within the detector. The detector has a built in molecular sieve that only allows hydrogen to diffuse into the detector. The 1/2 NPT mounting threads at the top of the detector allow you to mount it into the bottom conduit hub of the junction box. The controller conduit hubs are normally 3/4 NPT, so a 3/4 x 1/2 NPT reducer may be necessary to install the hydrogen detector.

A rainshield screws onto the bottom of the detector (flame arrestor end). The rainshield helps protect the detector from rain and debris in the monitoring environment. Three color-coded leads extend from the top of the detector. The leads allow you to connect the detector to the terminal block.

Junction Box

The junction box allows you to install the detector at a mounting site that is remote from the RM-5000, and it protects the detector wiring connections. Two conduit hubs allow you to mount the detector to the junction box and connect the wiring from the detector to the RM-5000. Three spacers installed on the back of the junction box control the distance of

the junction box from a mounting surface and ensure that there is enough room to install a calibration cup on the detector during calibration.

The bottom conduit hub includes a 3/4 NPT x 1/2 NPT reducer that allows you to screw the detector into the hub. The 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. A ground boss near the top conduit hub provides an external earth ground connection.

Installation

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

Mounting the Hydrogen 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 hydrogen, which is lighter than air, mount the detector near the ceiling or where hydrogen is most likely to accumulate.

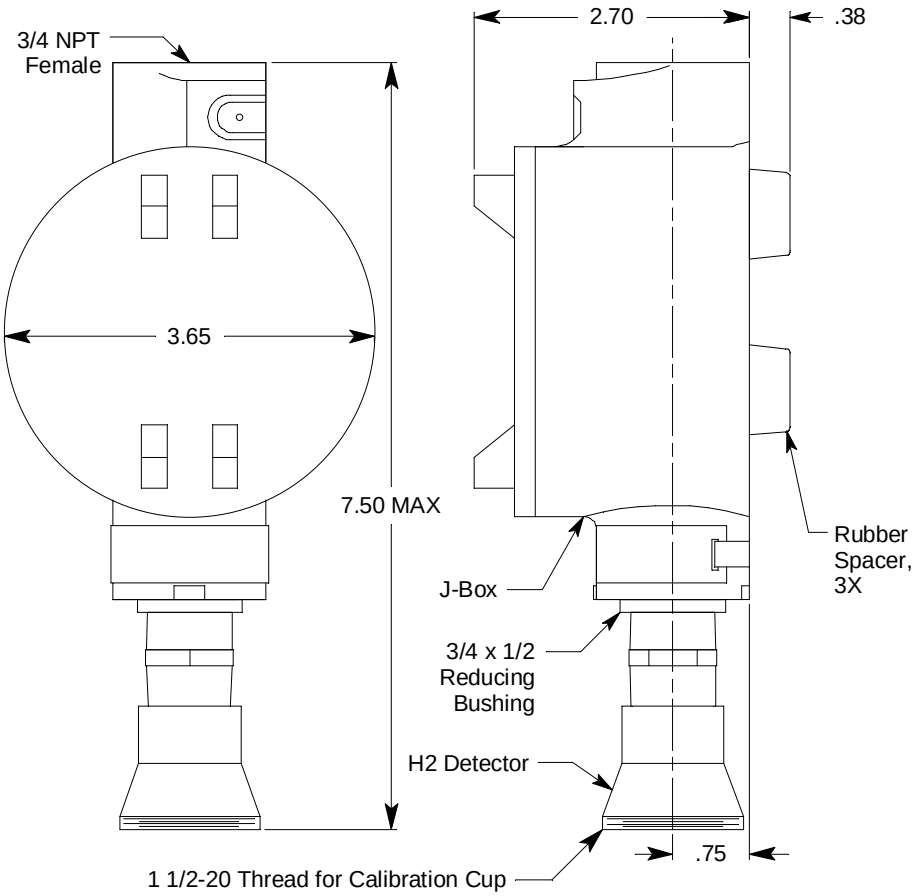

Figure 2: Mounting the Hydrogen Detector

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

Wiring the Hydrogen Detector to the RM-5000

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

1. Verify that all power to the RM-5000 is turned off or unplugged at the power source end.
2. Remove the junction box cover.
3. Guide a three-conductor, shielded cable or three wires in conduit through the unused conduit hub of the junction box. Use appropriate conduit fittings and construction technique for the environmental rating and hazardous location classification of the junction box. The junction box is rated NEMA 4X and classified explosion proof for Class I, Groups B, C, and D.
4. Connect the wires to the terminal block in the junction box. See Figure 3 and Figure 4 below.

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 RM-5000.*

5. Secure the junction box cover to the junction box.
6. Route the cable or wires leading from the hydrogen detector to the RM-5000.

CAUTION: *Do not route power and detector wiring through the same wiring knockout. The power cable may disrupt the transmission of the detector signal to the RM-5000.*

7. Connect the wires to the RM-5000 as shown in Figure 3 and Figure 4 below. Your wiring will depend on whether you have the RM-5000 installed in a single case or a multi-case.
8. If using shielded cable, connect the cable's drain wire to an available chassis ground at the RM-5000.

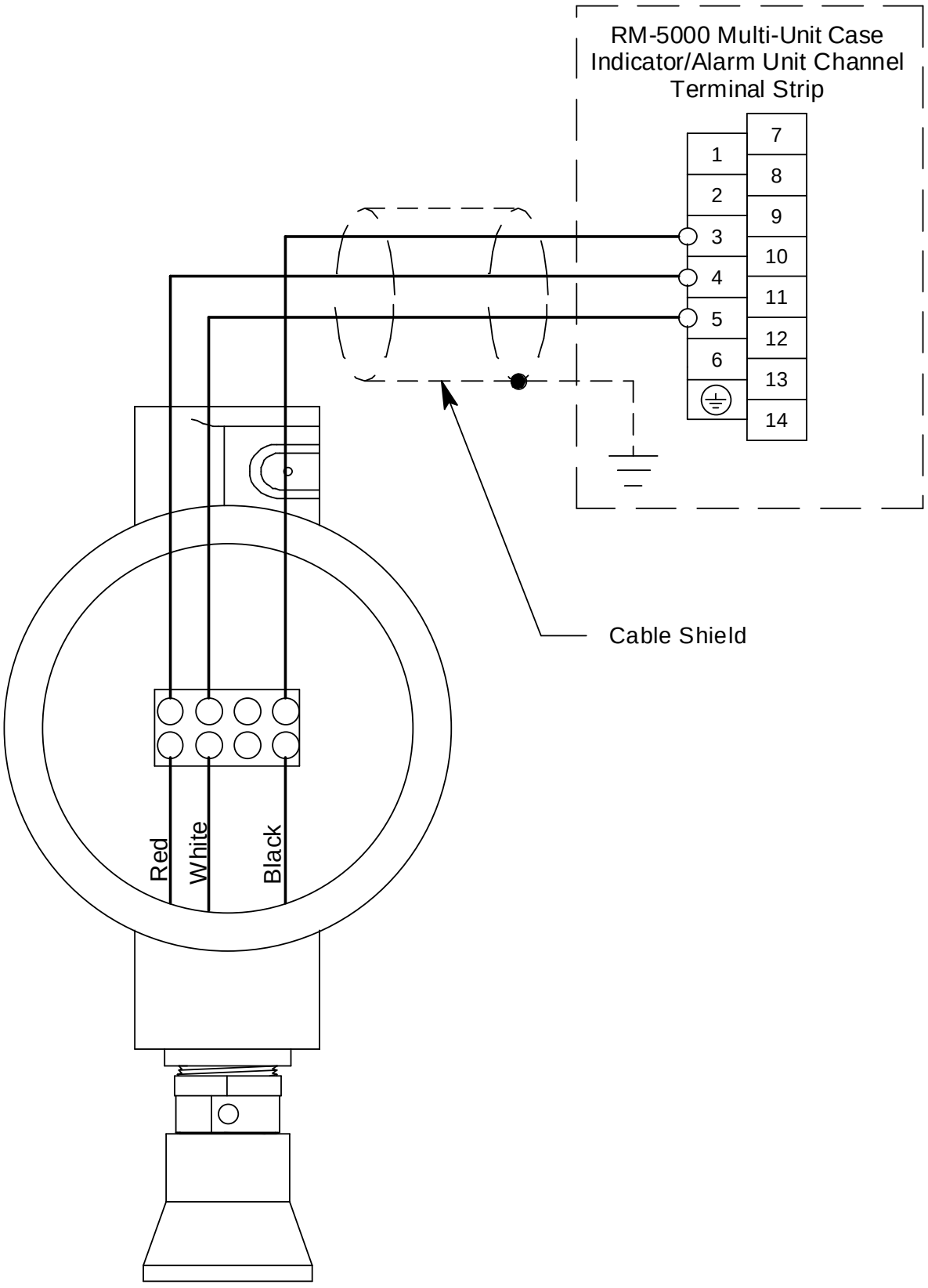

Figure 3: Wiring the Hydrogen Detector to a Multi-Case RM-5000

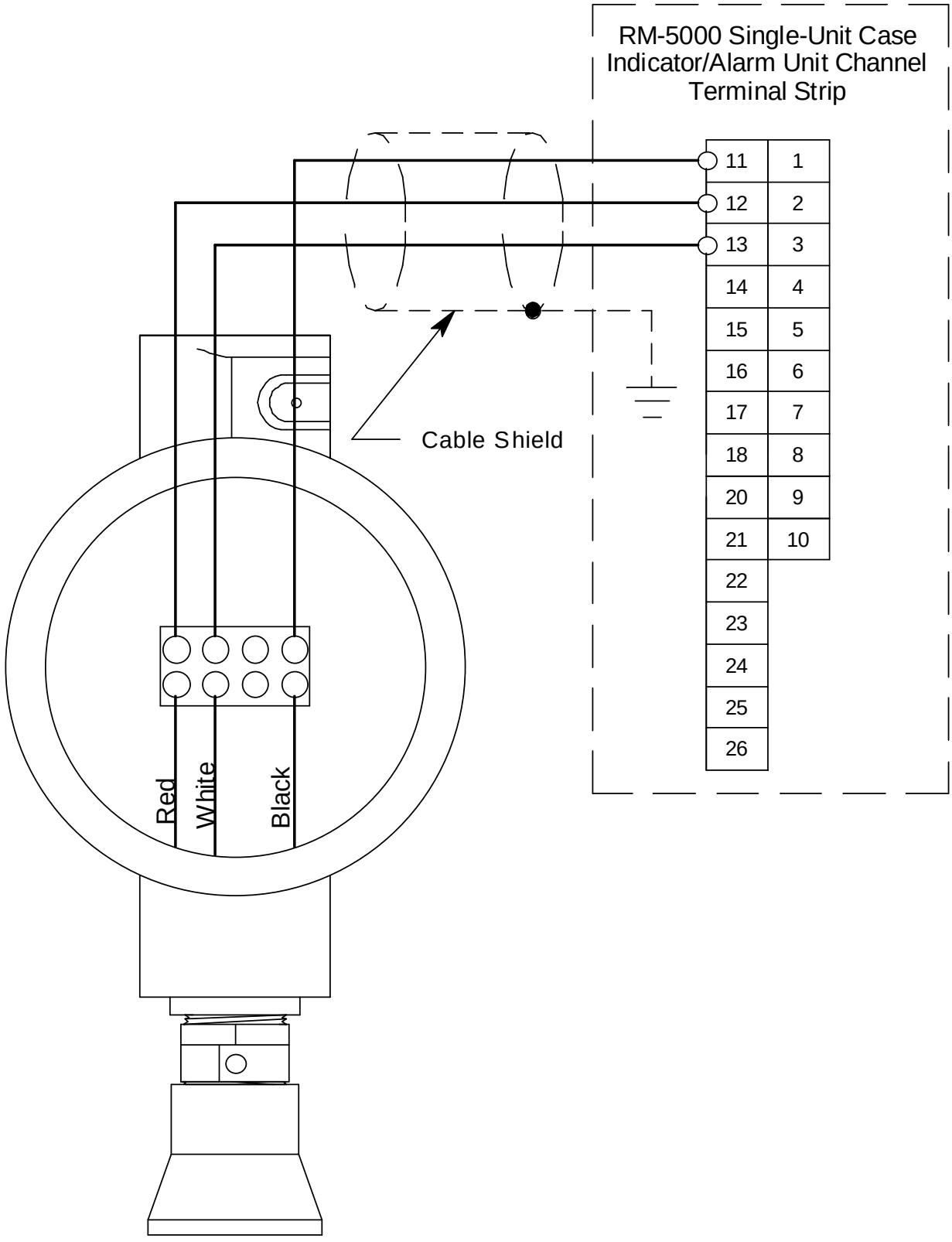

Figure 4: Wiring the Hydrogen Detector to a Single-Case RM-5000

Start Up

This section describes procedures to start up the hydrogen 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 RM-5000 is correct and secure.
   Single-Case Units: Refer to the Indicator / Alarm Unit RM-5000 Series Operator's Manual.
   Multi-Case Units: Refer to the RM-5000 Series Multi-Unit Case and the Indicator / Alarm Unit RM-5000 Series Operator's Manuals.
3. Turn on power to the RM-5000.
4. Verify that the RM-5000 is on.
   Single-Case Units: Refer to the Indicator / Alarm Unit RM-5000 Series Operator's Manual.
   Multi-Case Units: Refer to the RM-5000 Series Multi-Unit Case and the Indicator / Alarm Unit RM-5000 Series Operator's Manuals.

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

WARNING: ***Do not remove the junction box cover while the circuits are energized unless the area is determined to be non-hazardous. Keep the junction box cover tightly closed during operation.***

CAUTION: *If you suspect the presence of hydrogen in the monitoring environment, use the 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 hydrogen and of normal oxygen concentration, 20.9%).
2. Verify a reading of 0 on the bar graph display of the applicable channel.

   If the display reading is 0, start up is complete. The hydrogen detector is in normal operation. If the display reading is not 0, continue with step 3.
3. Perform a zeroing operation at the controller. See "Setting the Zero Reading" on page 12 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 hydrogen detector. It includes daily, monthly, and biannual procedures.

Daily

Verify that the power lamp on the applicable RM-5000 is on. If the power lamp is not on, see the Troubleshooting section.

Verify a display reading of 0. Investigate significant changes in the reading.

Monthly

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

WARNING: ***The RM-5000 is not an active gas monitoring device during the response test procedure.***

NOTE: Performing a response test on the hydrogen detector may cause alarms. Be sure to put the RM-5000 into Maintenance Mode 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 humidifier tube.

Preparing for the response test

1. Put the RM-5000 into Maintenance Mode by pressing and holding the MODE button for 5 seconds.
1. Navigate to the **2-0 GAS TEST** menu item.
2. Verify that the display reading is 0.

   If the display reading is not 0, set the zero reading then continue this procedure. See “Setting the Zero Reading” on page 12 for directions to set the zero reading.
3. Screw the regulator into the calibration cylinder.
4. Screw the calibration cup onto the bottom of the detector.
5. Use the humidifier tube 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 one minute.

3. Verify that the reading is within ± 20% of the gas concentration.

NOTE: If the readings are not within ± 20% of the gas concentration, calibrate the detector as described in "Calibration" on page 11.

4. Turn the regulator knob clockwise to close the regulator.
5. Unscrew the regulator from the calibration cylinder.
6. Unscrew the calibration cup from the detector.
7. When the controller display reading falls below the alarm points, return the RM-5000 to operation mode by pressing and holding the MODE button for 5 seconds.
8. Store the components of the calibration kit in a safe place.

Biannual

Calibrate the 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 hydrogen detector.

NOTE: This troubleshooting guide describes detector problems only.
Single-Case Units: Refer to the Indicator / Alarm Unit RM-5000 Series Operator's Manual for problems you may encounter with the RM-5000.
Multi-Case Units: Refer to the RM-5000 Series Multi-Unit Case and the Indicator / Alarm Unit RM-5000 Series Operator's Manuals for problems you may encounter with the RM-5000.

Table 2:Troubleshooting the Hydrogen Detector

Condition	Symptom(s)	Probable Causes	Recommended Action
Trouble Condition	• The power lamp flickers on the RM-5000. • The buzzer is sounding. • The trouble relay is activated.	• 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.

Table 2:Troubleshooting the Hydrogen Detector (Continued)

Condition	Symptom(s)	Probable Causes	Recommended Action
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 three months.* *Some applications may require a more frequent calibration schedule.*	• The calibration cylinder is low, out-dated, or defective. • The calibration gas is not an appropriate concentration. • The detector is malfunctioning.	1. Verify that the calibration cylinder contains an adequate supply of a fresh test sample. 2. Verify that the calibration gas concentration is appropriate for the detector. 3. If the calibration/response difficulties continue, replace the detector. 4. If the calibration/response difficulties continue, contact RKI for further instruction.

Replacing the Hydrogen Detector

1. Turn off or unplug all power to the RM-5000 at the power source end.
2. Remove the junction box cover.
3. Disconnect the detector leads from the terminal block in the junction box. Note the position of the color-coded leads as you remove them.
4. Unscrew the detector from the controller conduit hub or junction box conduit hub.
5. Guide the detector leads of the replacement detector through the junction box conduit hub, then screw the mounting threads of the detector into the hub. If necessary for environmental conditions, apply thread sealant or Teflon tape to the hub and / or detector threads to seal them.
6. Connect the detector leads to the terminal block the same way the old detector was wired (see Figure 3 and Figure 4).
7. Reinstall the junction box cover.
8. Turn on or plug in power to the RM-5000.

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

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9. 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 6 to 12 months is adequate for most hydrogen detector applications. Unless experience in a particular application dictates otherwise, RKI Instruments, Inc. recommends a calibration frequency of every 6 months.

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

If an application is very demanding, for example if hydrogen is present often and in significant concentrations or the environment is not well controlled, then more frequent calibration than every 6 months may be necessary. If potential catalyst poisons are known or likely to be present, more frequent calibration than every 6 months will be necessary.

Calibration

This section describes how to calibrate the hydrogen detector. It includes procedures to prepare for calibration, set the zero reading, set the response reading, and return to normal operation.

WARNING: ***The RM-5000 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 humidifier tube to connect the regulator to the calibration cup.

Calibration Kit Humidifier Tube

The ppm hydrogen detector requires normal atmospheric humidity levels to respond properly to hydrogen. Normal atmospheric humidity variations do not affect the detector's response to hydrogen in ambient air, but the ultra low humidity level of gas from a calibration cylinder requires that the calibration sample be humidified for the detector to respond properly. The calibration kit for the ppm hydrogen transmitter includes a humidifier tube that is not normally included in other calibration kits. This humidifier tube humidifies the calibration sample flowing through it by absorbing humidity from the ambient air and adding it to the sample. The humidifier tube is included in the "Parts List" on page 13.

WARNING: ***A humidifier tube must be used when calibrating the ppm hydrogen transmitter test for the detector to respond properly to the calibration gas. Failure to use a humidifier tube will result in an inaccurate calibration.***

Preparing for Calibration

1. Screw the calibration cup onto the bottom of the detector.
2. Screw the regulator into the calibration cylinder.
3. Use the humidifier tube to connect the regulator to the calibration cup.
4. Put the RM-5000 into Maintenance Mode by pressing and holding the MODE button for 5 seconds. **This disables all alarm functions.**

Setting the Zero Reading

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

1. Navigate to the **2-1 ZERO** menu item on the RM-5000.
2. Turn the regulator's on / off knob counterclockwise to open it.
3. Allow the gas to flow for one minute.
4. Follow the directions in the Indicator / Alarm Unit RM-5000 Series manual for setting the zero reading.
5. Turn the regulator's on / off knob clockwise to close it.
6. Leave the humidifier tube connected to the regulator and the calibration cup.

Setting the Response Reading

1. If not already in Maintenance Mode, put the RM-5000 into Maintenance Mode by pressing and holding the MODE button for 5 seconds.
2. Navigate to the **2-2 SPAN** menu item.
3. Be sure the regulator is screwed into a hydrogen calibration cylinder.
4. Turn the regulator's on / off knob counterclockwise to open it.
5. Allow the gas to flow for one minute.
6. Follow the directions in the Indicator / Alarm Unit RM-5000 Series manual for setting the span reading.
7. Turn the regulator's on / off knob clockwise to close it.
8. Unscrew the regulator from the cylinder.

Returning to Normal Operation

1. Unscrew the calibration cup from the detector.

NOTE: For convenience, leave regulator and calibration cup connected by the humidifier tube.

2. When the controller display reading falls below the alarm points, return the RM-5000 to operation mode by pressing and holding the MODE button for 5 seconds.

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

3. Verify that the controller display reading decreases and stabilizes at 0.
4. Store the components of the calibration kit in a safe and convenient place.

Parts List

Table 3 lists replacement parts and accessories for the 61-1050RK hydrogen detector.

Table 3: Parts List

Part Number	Description
18-0400RK-01	Junction box with spacers
33-2001RK-01	6 inch humidifier tube with 3/16" tubing on each end, for calibration kit
61-1060RK	Replacement hydrogen detector
71-0457	61-1050RK Hydrogen Detector with RM-5000 Series Operator's Manual (this document)
81-0000RK-01	Calibration cylinder, 1000 ppm hydrogen in air, 34 liter steel
81-0000RK-03	Calibration cylinder, 1000 ppm hydrogen in air, 103 liter
81-0076RK-01	Zero air calibration cylinder, 34 liter steel
81-1050RK	Regulator, 0.5 LPM with pressure gauge and flow control knob, for 17 and 34 liter steel calibration cylinders (cylinders with external threads)
81-1051RK	Regulator, 0.5 LPM with pressure gauge and flow control knob, for 34 liter aluminum, 58 liter and 103 liter calibration cylinders (cylinders with internal threads)
81-1117RK	Calibration cup
81-F007RK	Calibration kit, includes regulator, humidifier tube, calibration cup, and 103 liter 1000 ppm hydrogen calibration cylinder
81-F007RK-LV	Calibration kit, includes regulator, humidifier tube, calibration cup, and 34 liter 1000 ppm hydrogen calibration cylinder