



INSTRUMENTS

Operator's Manual

65-2515RK Oxygen Detector

Part Number: 71-0137RK

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www.rkiinstruments.com

Product Warranty

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- | | |
|-------------------------------|--------------------|
| a) Absorbent cartridges | d) Batteries |
| b) Pump diaphragms and valves | e) Filter elements |
| c) Fuses | |

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.

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Overview


This manual describes the 65-2515RK oxygen detector (internal amplifier type). 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.

Specifications

Table 1 lists specifications for the 65-2515RK oxygen detector.

Table 1: 65-2515RK Specifications

Target Gas	Oxygen
Sampling Method	Diffusion
Detection Range	0 - 25.0% oxygen
Oxygen Detector Signal Output	0 mV at 0% volume oxygen nominal 18 mV at 25% oxygen nominal
Response Time	90% in 30 seconds
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).
Operating Temperature	-20° C to 45° C

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

Description

This section describes the components of the 65-2515RK. It consists of the oxygen detector and the junction box

Oxygen Detector

The oxygen detector consists of the detector housing and the plug-in sensor.

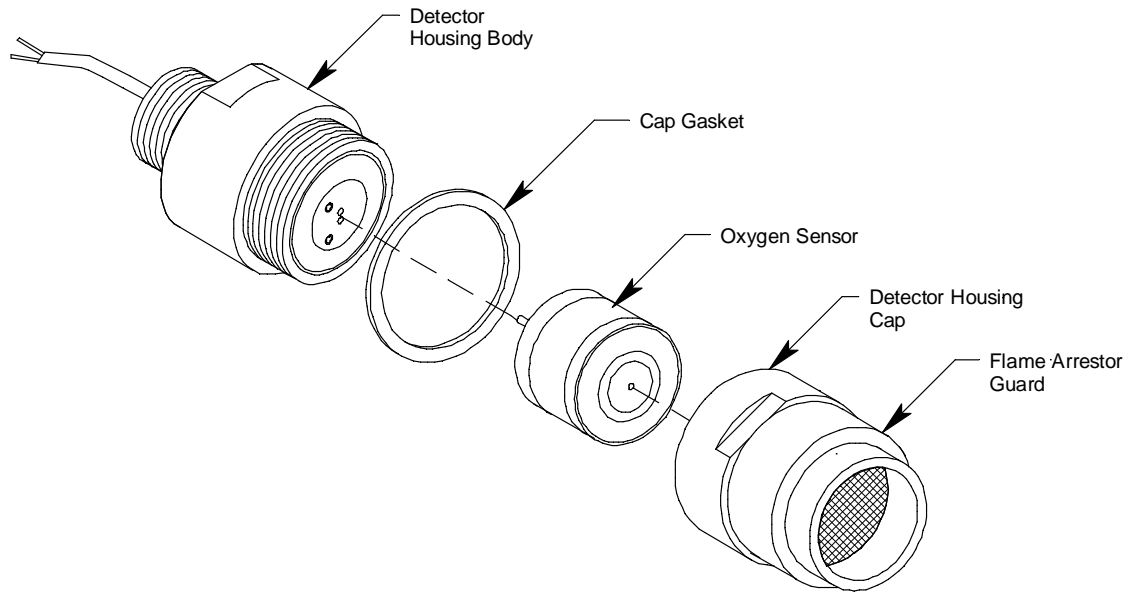


Figure 1: Oxygen Detector Component Location

Detector housing

The detector housing protects the sensing components within the housing. Use the mounting threads at the top of the housing to screw the oxygen detector into the bottom conduit hub of the junction box. 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 that may occur within the detector housing. A cap gasket seals the interface between the housing body and cap. The flame arrestor guard protects the flame arrestor from impact damage and is permanently bonded to the cap.

Two color coded wires extend from the top of the detector housing. Use these wires to connect the oxygen detector to a controller via the terminal block in the junction box. The detector housing includes two sockets installed on a circuit board. These sockets accept the plug-in sensor's two pins to secure the sensor within the detector housing. The circuit board with the sockets conditions the sensor's signal before it exits the detector housing via the two color coded wires.

Plug-In Sensor

The plug-in sensor is plugs into a circuit board in the detector housing with two pins and is retained by the cap. Through a series of chemical and electrical reactions, the sensor produces an electrical output that is proportional to the detection range of the oxygen detector.

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 route 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

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.

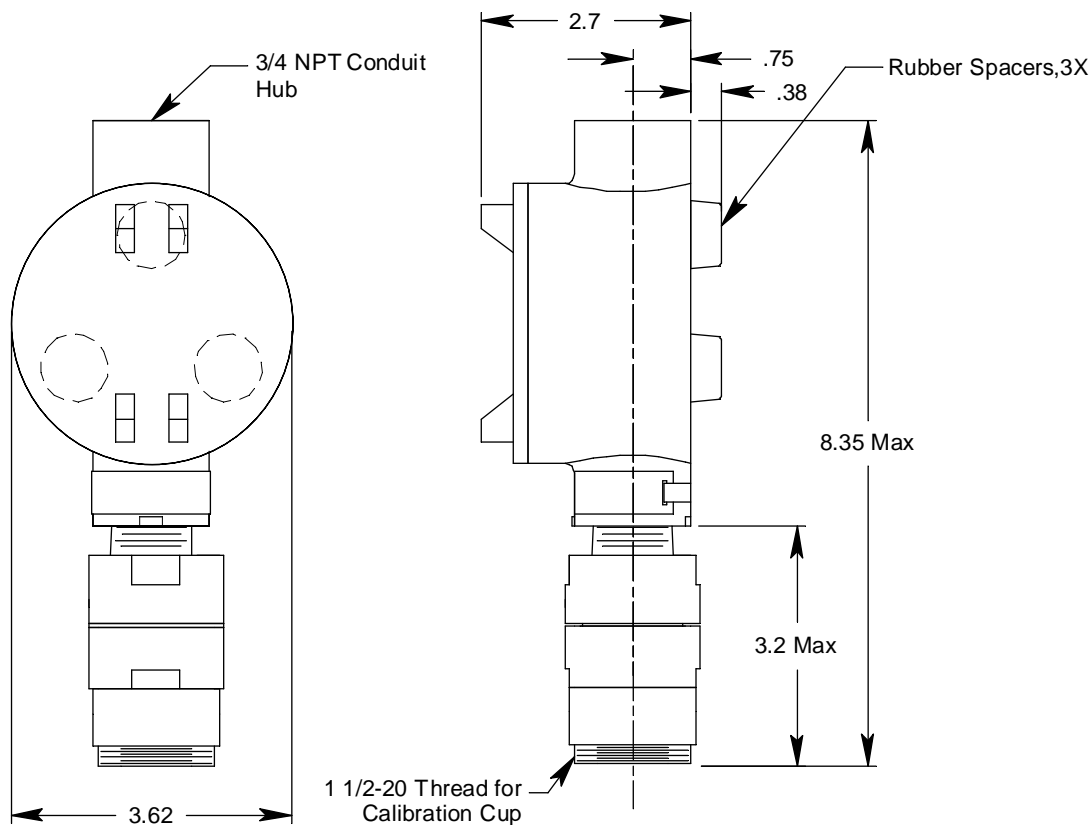


Figure 2: 65-2515RK Outline & Mounting Dimensions

NOTE: The oxygen detector in the 65-2515RK is normally provided with an Adalet XIHSCFC3 junction box rated explosion proof for Class I, Groups B, C, and D. This combination is shown in Figure 2 above. Any 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 may be used for this detector.

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

Wiring the Oxygen Detector to a Controller

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

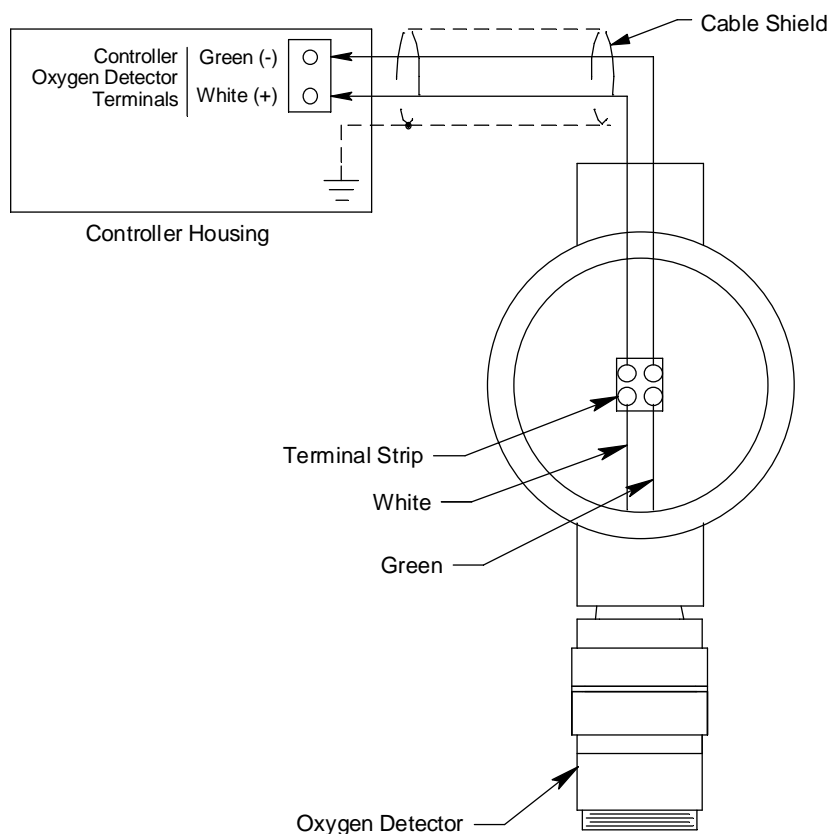


Figure 3: Wiring the Oxygen Detector to a Controller

1. Turn off the controller.
2. Turn off or unplug power to the controller.
3. Remove the junction box cover.

WARNING: To maintain the explosion proof classification of the oxygen 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.

4. Guide a two-conductor, shielded cable or two wires in conduit through the unused conduit hub of the junction box.
5. Connect the wires to the terminals opposite the detector leads using the terminal strip in the junction box.

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.*

6. Reinstall the junction box cover to the junction box.
7. Route the cable or wires leading from the oxygen 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.*

8. Connect the wires to the applicable controller terminal strip as shown in Figure 3 above. See the controller operator's manual and the controller's detector head specification sheet for wiring information specific to a controller.
9. Connect the cable's drain wire to an available chassis ground at the 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 operator's 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, "Verifying/Setting the Fresh Air Reading."*

Verifying/Setting the Fresh Air Reading

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

NOTE: If you can 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), it is not necessary to apply zero air when verifying or setting the fresh air reading.

The procedure below describes applying zero air 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

1. Screw the calibration cup onto the bottom of the oxygen detector.
2. Screw the regulator into the zero air calibration cylinder.
3. Use the sample tubing to connect the regulator to the calibration cup.
4. Turn the regulator's on/off knob counterclockwise to open it. Gas will begin to flow.
5. Allow the gas to flow for two minutes.
6. Verify a reading of 20.9% oxygen at the controller.

If the display reading is 20.9% oxygen, the oxygen detector is in normal operation and start up is complete. Proceed to step 7 to disassemble the calibration kit.

If the display reading is not 20.9% oxygen, turn the regulator's on/off knob clockwise to close it, then proceed to "Setting the Fresh Air Reading" on page 14 to set the fresh air reading.

7. Turn the regulator's on/off knob clockwise to close it.
8. Unscrew the regulator from the zero air calibration cylinder. For convenience, leave the sample tubing connected to the regulator and the calibration cup.
9. Unscrew the regulator from the cylinder and remove the calibration cup from the detector.
10. Store the components of the calibration kit in a safe and convenient place.

Maintenance

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

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

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 “Calibration” on page 13 and the controller operator’s manual for instructions to set the fresh air reading.
3. Screw the calibration cup over the bottom of the detector.
4. Use the sample tubing to connect the regulator to the calibration cup.
5. Screw the regulator into the calibration cylinder. The sample will begin to flow.

6. When the reading at the controller stabilizes after about a minute, verify that the reading meets one of the following conditions depending on the calibration gas used:
 - If 100% nitrogen (0% oxygen) is used, the reading should be 0% oxygen \pm 1% oxygen.
 - If a cylinder other than 100% nitrogen is used that has an oxygen content, such as 12% oxygen, the reading should be within \pm 5% of the oxygen concentration.

NOTE: If the reading does not meet one of the conditions in step 6 above, calibrate the detector as described in “Calibration” on page 13.

7. Unscrew the regulator from the cylinder and remove the calibration cup from the detector. For convenience, leave the calibration cup and regulator connected by the sample tubing.
8. 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.

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

Quarterly

Calibrate the detector as described in “Calibration” on page 13. See the calibration frequency discussion in “Calibration Frequency” on page 13 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	<ul style="list-style-type: none"> • Controller indicates a fail condition. 	<ul style="list-style-type: none"> • The detector wiring is disconnected or misconnected. • The plug-in oxygen sensor is not properly installed. • The detector is malfunctioning. 	<ol style="list-style-type: none"> 1. Verify that the detector wiring is correct and secure. 2. Confirm that the plug-in oxygen sensor inside the detector housing is installed properly. 3. Calibrate the detector. 4. If the fail condition continues, replace the plug-in oxygen sensor. 5. If the fail condition continues, contact RKI for further instruction.

Table 2: Troubleshooting the Oxygen Detector (Continued)

Condition	Symptom(s)	Probable Causes	Recommended Action
Slow or No Response/ Difficult or Unable to Calibrate	<ul style="list-style-type: none"> 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. <p><i>Note: Under “normal” circumstances, the detector requires calibration once every three months. Some applications may require a more frequent calibration schedule.</i></p>	<ul style="list-style-type: none"> The calibration cylinder is low, out-dated, or defective. The plug-in sensor is malfunctioning 	<ol style="list-style-type: none"> Verify that the calibration cylinder contains an adequate supply of a fresh test sample. If the calibration/response difficulties continue, replace the plug-in sensor. If the calibration/response difficulties continue, contact RKI for further instruction.

Replacing the Oxygen Plug-in Sensor

- Turn off the controller.
- Turn off or unplug incoming power.
- Unscrew the detector housing cap from the detector housing.
- Unplug and remove the oxygen sensor.
- Carefully plug the replacement sensor into the socket pattern that is located in the top section of the detector housing.

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

- Screw the detector housing cap onto the detector housing.
- Turn on or plug in incoming power.
- Turn on the controller.

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

- Calibrate the replacement sensor as described in “Calibration” on page 13.

Replacing the Oxygen Detector

NOTE: In most cases, it is only necessary to replace the plug-in oxygen sensor.

- Turn off the controller.
- Turn off or unplug incoming power.
- 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.

WARNING: *A minimum of 5 detector threads must be fully engaged with the junction box hub threads when a detector is replaced to maintain the explosion proof classification of the detector/junction box combination.*

7. Wire the detector leads to the terminal block in the same position as the leads you removed in step 4.
8. Reinstall the junction box cover.
9. Turn on or plug in incoming power.
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 13.

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 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.

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.*

Preparing for Calibration

1. Screw the calibration cup onto the bottom of the oxygen 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 oxygen 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 Fresh Air Reading

1. Follow the directions in the controller operator's manual for setting the fresh air reading.
2. When the instructions call for applying zero air to the detector, turn the regulator's on/off knob counterclockwise to open it. Zero air will begin to flow.
3. Allow the gas to flow for two minutes.
4. Set the fresh air 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 Zero Reading

1. Screw the regulator into the calibration gas cylinder, normally 100% nitrogen.
2. Follow the instructions in the controller's operator's manual for setting the oxygen zero reading.
3. When the instructions call for exposing the detector to gas, normally 100% nitrogen, turn the regulator's on/off knob counterclockwise to open it. Gas will begin to flow.
4. Allow gas to flow to the detector for two minutes.
5. Set the zero reading according to the controller operator's manual.
6. After setting the zero reading, unscrew the regulator from the cylinder and remove the calibration cup from the detector. For convenience, leave the calibration cup and regulator connected by the sample tubing.
7. Allow about 45 seconds for the oxygen reading to increase above the decreasing alarm point and 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.

8. Verify that the controller display reading increases and stabilizes at 20.9% oxygen.
9. 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
65-1025RK	Oxygen replacement sensor, plug-in
65-2514RK	Oxygen replacement detector assembly (includes plug-in sensor), CSA classified (does not include junction box)
65-2515RK	Oxygen detector/junction box, CSA classified
71-0137RK	<i>65-2515RK Oxygen Detector w/Junction Box Operator's Manual</i> (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)
81-1050RK	Regulator, 0.5 liter/minute with on/off valve (for 17- and 34-liter calibration cylinders)
81-1117RK	Calibration cup