Beacon 200 Gas Monitor
Operator's Manual

Part Number: 71-0059RK

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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 as follows:

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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Chapter 1: Introduction

Overview

This chapter briefly describes the Beacon 200 Gas Monitor. This chapter also describes the *Beacon 200 Gas Monitor Operator's Manual* (this document). Table 1 at the end of this chapter lists the specifications for the Beacon 200.

About the Beacon 200 Gas Monitor

The Beacon 200 is a fixed-mounted, continuous-monitoring gas detection instrument. This gas monitor is capable of detecting gas at up to two locations. The display screen simultaneously displays the gas readings of the active channel or channels. Both direct connect (internal amplifier type) detector heads and 4 - 20 mA transmitter (remote amplifier type) detector heads may be used with the Beacon 200.

The Beacon 200 includes audible and visual alarms that warn you of hazardous gas conditions. The alarm circuit includes two levels of gas alarms. The fail circuit alerts you to failures in the gas detector heads or Beacon 200.

Three instrument programs allow you to display and change channel and calibration settings and change channel types. They are the Channel Control & Setup Program and the Calibration Program, and the Input Setup Program.

About this Manual

The *Beacon 200 Gas Monitor Operator's Manual* is organized as follows:

- **Chapters 1 through 6** describe components of the Beacon 200 and procedures to install, start up, operate, and maintain the Beacon 200.

The *Beacon 200 Gas Monitor Operator's Manual* uses the following conventions for notes, cautions, and warnings.

NOTE: Describes additional or critical information.

CAUTION: *Describes potential damage to equipment.*

WARNING: ***Describes potential danger that can result in injury or death.***

Caution: refer to accompanying documentation

~ Vac (AC voltage)

⎓ Vdc (DC voltage)

Specifications

Table 1 lists specifications for the Beacon 200 Gas Monitor.

Table 1: Beacon 200 Specifications

Description	Specification
Input Power	115/220V ~ ±10%, 50/60Hz, 0.5/0.3A[1] **or** 24 V ⎓ +10% -8%, 0.6A VDC
Construction (housing)	Fiberglass/polyester with lexan window (NEMA 4X)
Dimensions	10.5 in. H x 8.5 in. W x 6.25 in. D (267 mm H x 216 mm W x 158 mm D)
Weight	8 lbs.
Environmental Conditions	• For indoor or outdoor locations (Type 4X) • 2000m max. altitude • -20°C to 50°C (-4°F to 122°F) max. ambient • Maximum humidity of 80% relative • Mains supply voltage fluctuations not exceeding ± 10% of nominal • DC supply voltage fluctuations not exceeding +10% -8% of nominal • Overvoltage Category II, Pollution Degree 2
Safety/Regulatory	C SP US 186718
Relays	• Relay contacts rated for 10A @ 115/220V~ resistive or10A @ 30V ⎓ resistive • SPDT Form C
User Controls	• Reset switch • Program buttons: ESCAPE, UP/YES, DOWN/NO, and ENTER
Standard Accessory	Operator's manual (this document)

* ***[1]The AC voltage input is factory set. The standard input is 115 V~.***

CAUTION: *Cleaning is not to be performed.*

CAUTION: *The operator of this instrument is advised that if the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.*

Chapter 2: Description

Overview

This chapter describes external and internal components of the Beacon 200 Gas Monitor.

External Description

This section describes the housing and all external components of the Beacon 200. For the purposes of this description, the housing door is considered the front of the monitor.

Housing

The Beacon 200'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 display screen and status lights are visible through windows in the housing door. Four mounting feet are attached to the back of the housing (one at each corner). The mounting feet allow you to install the housing to a vertical surface. Three conduit hubs on the bottom of the housing are for external wiring connections.

CAUTION: *To avoid electrical interference, do not route detector head and power wiring through the same conduit hub.*

Reset Switch

The reset switch is on the bottom of the housing. It is in front of the conduit hubs. The reset switch serves three functions:

- Resets the alarm circuits for "latched" alarms after an alarm 1 or alarm 2 condition passes.

  You can set each channel for latched or self-resetting alarms in the Channel Control & Setup Program.

- Silences the buzzer during an alarm 1 or alarm 2 condition. You cannot silence failure alarms.

- Displays and resets the minimum and maximum gas concentration values.

Buzzer

The buzzer is on the bottom of the housing. It is on the far right. The buzzer sounds audible alarms to warn you of gas alarms and instrument failures.

Internal Description

This section describes the internal components of the Beacon 200.

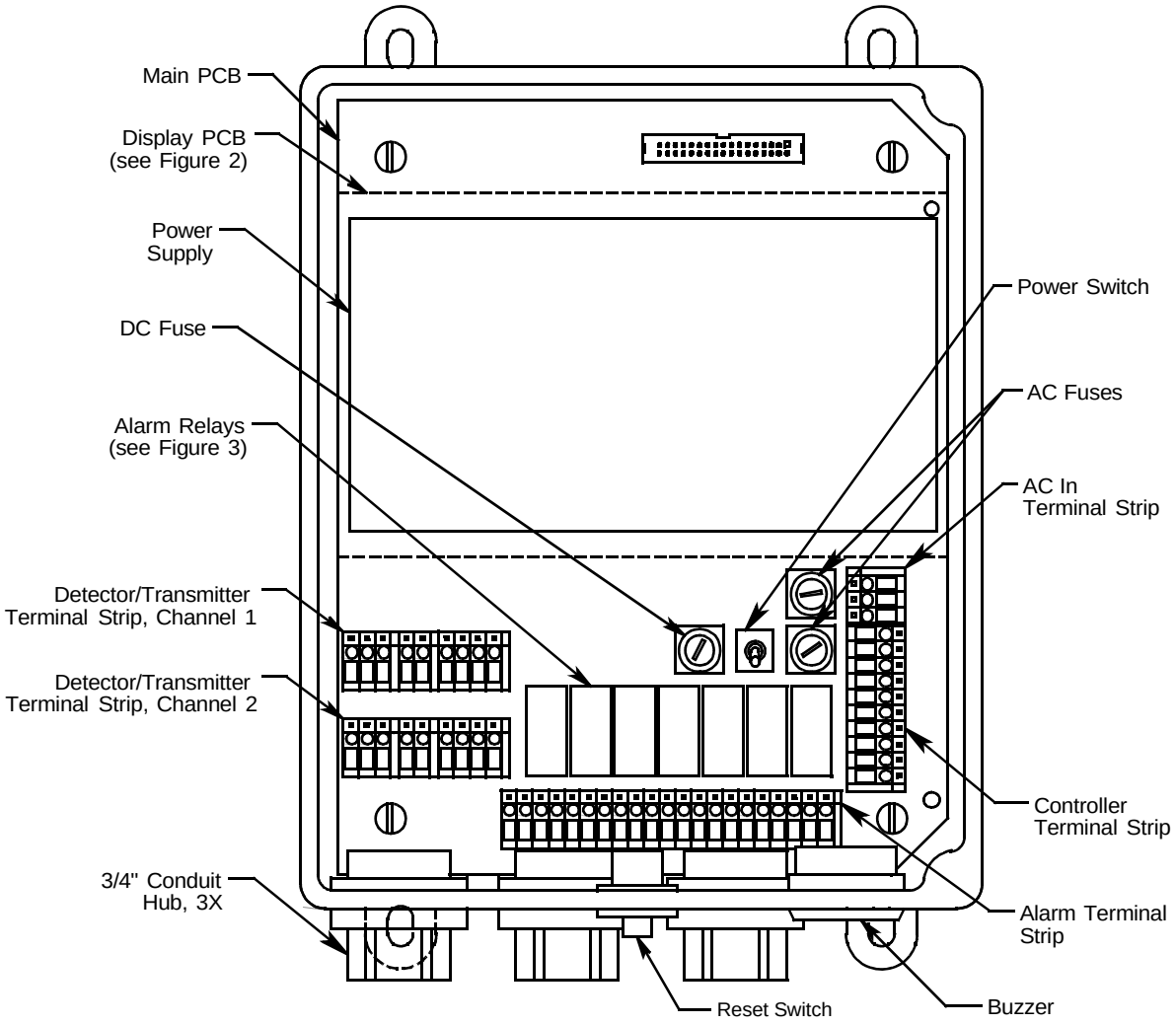

Figure 1. Beacon 200 Gas Monitor Component Location

Display Printed Circuit Board (PCB)

The display PCB is mounted to the power supply mounting plate which is in turn mounted to the main PCB. The power supply mounting plate and main PCB are described below. The display PCB includes the display, the status lights, and the program buttons.

Display

The display simultaneously indicates the channel number, current gas reading, measuring unit, and target gas of all active channels.

The display also indicates messages, settings, and other data when you are operating the instrument programs.

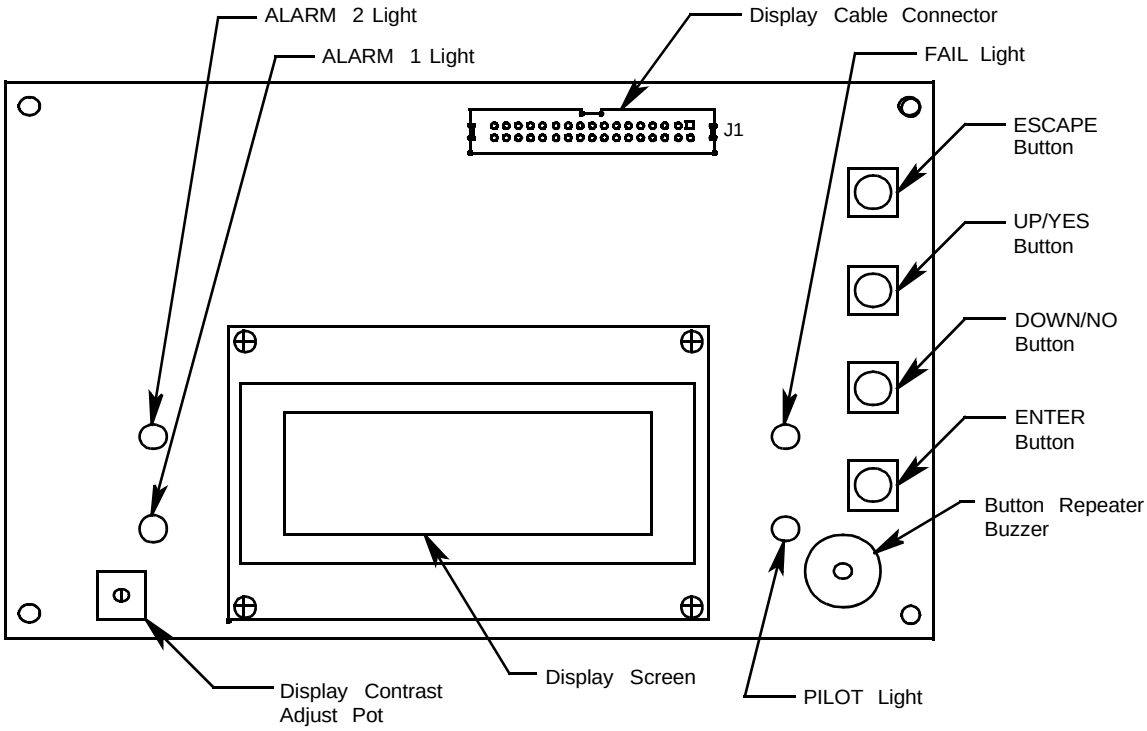

Figure 2. Display Board Component Location

Status Lights

The Beacon 200 includes four status lights that indicate the current status of the monitor. The status lights are to the left and right of the display (see Figure 2).

- **Pilot Light.** The pilot light is on when the Beacon 200 is receiving incoming power.
- **Fail Light.** The fail light turns on when the Beacon 200 is experiencing a fail condition. A fail condition can be caused by a failure within the Beacon 200 or detector head(s) wired to the Beacon 200. See Chapter 5, Maintenance, or the troubleshooting section in the applicable detector head manual to respond to a fail condition.
- **Alarm 1 Light**. The alarm 1 light is on when the Beacon 200 is experiencing an alarm 1 gas condition.
- **Alarm 2 Light**. The alarm 2 light is on when the Beacon 200 is experiencing an alarm 2 gas condition.

Program Buttons

The Beacon 200 includes four program buttons that allow you to enter the instrument programs, navigate through the programs, update instrument and channel settings, and save changes to the program settings. When a program button is pressed, a buzzer located on the display PCB beeps. The program buttons are near the right edge of the display PCB (see Figure 2).

Table 2: Beacon 200 Program Button Functions

Button	Function
ESCAPE	• Moves backward through the program menus • Cancels changes you make in the program menus • Enters the Channel Control and Setup program (press with the ENTER button)
UP/YES	• Accepts the displayed setting and proceeds to the next setting • Changes the displayed setting • Enters the Calibration program (press with the ENTER button)
DOWN/NO	• Allows you to update the displayed setting • Changes the displayed setting
ENTER	• Saves changes you make in the programs • Enters the Channel Control and Setup program (press with ESCAPE button) • Enters the Calibration program (press with the UP/YES button) • Enters the Input Setup Program (press while flipping power switch to ON position)

Main PCB

The main PCB is mounted inside the housing. The power supply mounting plate is mounted to the main PCB with four standoffs and the display PCB is mounted to the power supply mounting plate with four standoffs. The main PCB includes the terminal strips, relays, fuses, and power switch.

Terminal Strips

The Beacon 200 includes four terminal strips for external wiring connections. See “Wiring the Beacon 200 Gas Monitor” for detailed wiring procedures.

- **Detector/Transmitter Terminal Strips.** Two detector/transmitter terminal strips are located near the bottom left corner of the main circuit board (see Figure 1). These two 9-point terminal strips facilitate wiring connections to the detectors or transmitters. Although each terminal strip can accommodate several different detector head models, only one detector head at a time may be wired per channel. The top terminal strip is for channel 1 and the bottom terminal strip is for channel 2.
- **Alarm Terminal Strip.** The alarm terminal strip is located along the bottom edge of the main circuit board (see Figure 1). This 21-point terminal strips facilitates wiring connections to external alarm devices (horn, strobe, etc.). Terminals are provided for individual channel as well as common alarm relay contacts.
- **Controller Terminal Strip.** The 10-point controller terminal strip is near the lower right edge of the main circuit board (see Figure 1). The controller terminal strip facilitates various internal and external wiring connections. Table 3 lists the function of each terminal.

Table 3: Terminal Assignments for the Controller Terminal Strip

Terminal	Connects to:
BAT -	- connection from 24 VDC power source[1] (or 24 V backup battery)
BAT +	+ connection from 24 VDC power source[1] (or 24 V backup battery)
+ CH1 OUT	+ connection of 4 - 20 mA output, channel 1
- CH 1 OUT	- connection of 4 - 20 mA output, channel 1
+ CH2 OUT	+ connection of 4 - 20 mA output, channel 2
- CH2 OUT	- connection of 4 - 20 mA output, channel 2
RESET (2)	Reset switch (factory-wired)
BUZ-/BUZ+	Internal buzzer (factory-wired)

[1] If DC power is used as the primary power source, do not make wiring connections to the AC terminal strip.

- **AC In Terminal Strip.** The AC in terminal strip is a 3-point terminal strip located above the controller terminal strip (see Figure 1). It facilitates wiring from the AC power source. Table 4 lists the function of each terminal.

Table 4: Terminal Assignments for the AC In Terminal Strip

Terminal	Connects to:
LINE	Hot wire from AC power source.
NEUT	Neutral wire from AC power source.
GND	Earth ground

Relays

The Beacon 200 includes four channel relays (two per channel) and three common relays. Both sets of relays are single-pole, double-throw (SPDT) and are rated for 10 amps at 250 VAC (resistive).

NOTE: You can select normally energized (NE) or normally de-energized (NDE) settings for each channel in the Channel Control and Setup program. This section describes the default setting: normally de-energized.

The alarm 1 and alarm 2 common relays are factory-set as NDE and the fail common relay is factory-set as NE. The alarm 1, alarm 2, and fail common relays' NE/NDE settings are not user-adjustable.

- **Channel relays.** The four channel relays are above the alarm terminal strip (see Figure 1). These relays are dedicated to specific channels and alarm levels.

  For example, the channel 1, alarm 1 relay energizes if channel 1 recognizes an alarm 1 condition. Figure 3 below illustrates the allocation of the channel relays

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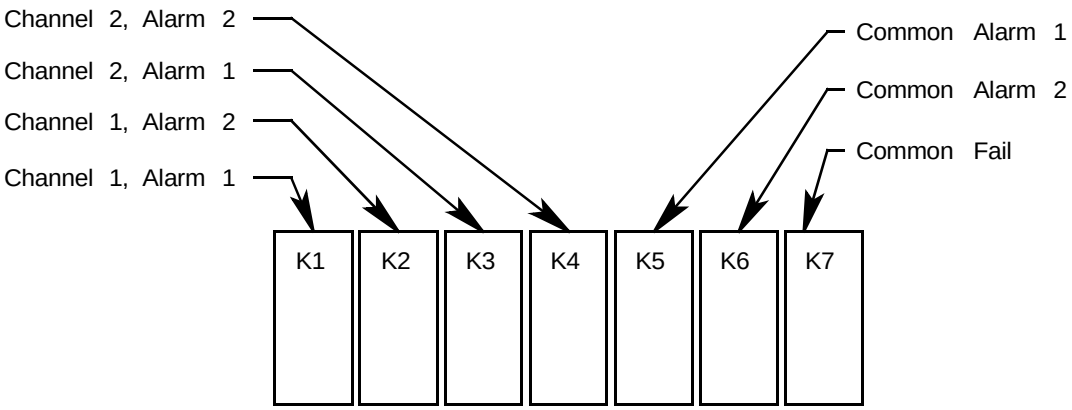

Figure 3. Beacon 200 Channel Relay Allocation

NOTE: The alarm 2 channel relays may be set to operate as individual channel fail relays. See the Configure Channel Settings section of Chapter 5 for instructions.

- **Common relays.** The three common relays, alarm 1, alarm 2, and fail, are to the left of the controller terminal strip (see Figure 1). These relays are common for both channels.

  For example, the alarm 1 common relay energizes if **either** channel 1 or channel 2 recognizes an alarm 1 condition.

Fuses

There are three fuses that are used in the Beacon 200. Two of them are AC fuses and one of them is a DC fuse.

- **AC Fuses.** The two fuses located directly to the left of the controller terminal strip are the AC fuses. They cut off the incoming AC power in the event of a short circuit or other electrical fault which causes a high current draw in the Beacon 200. They are housed in vertical fuse holders and are held in the holder by a quarter turn cover. They are labelled as F2 (top fuse) and F3 (bottom fuse) on the PCB silk-screen and are rated at 3 A, 250 V.
- **DC Fuse.** The fuse located to the left of the power switch is the DC fuse. It cuts off incoming DC power in the event of a short circuit or other electrical fault which causes a high current draw in the Beacon 200. It is also housed in a vertical fuse holder and is held in the holder by a quarter turn cover. It is labelled as F1 on the PCB silk-screen and is rated at 6A, 250 V.

Power Switch

The power switch is located above the relays and in between the AC and DC fuses (see Figure 1). The power switch turns the incoming AC power source on and off at the Beacon 200. When the switch is up, the power switch is on.

NOTE: The DC power input has no on/off switch and is not affected by the position of this switch.

Power Supply

The power supply is mounted to the power supply mounting plate which is located behind the display PCB. The power supply mounting plate is mounted to the main PCB with four standoffs. The power supply receives the AC input from the external power source and converts it to a DC voltage that is usable by the Beacon 200 circuitry.

Chapter 3: Installation and Start Up

Overview

This chapter describes procedures to mount the Beacon 200 Gas Monitor, make wiring connections to the monitor, and start up the monitor.

WARNING: Perform all installation and start-up procedures in a "fresh air" environment (known to be free of combustible gas, toxic gas, and of normal oxygen content). The Beacon 200 is not in operation as a gas monitoring system until the start-up procedure is complete.

Mounting the Beacon 200 Gas Monitor

Perform the following procedure to install the Beacon 200 at the mounting site.

1. Select the mounting site. When you select the mounting site consider the following factors:
   - Is an AC or DC power source available?
   - Is there enough room to open the housing door and make wiring connections through the conduit hubs at the bottom of the housing?
   - Are the display screen and status lights visible?
2. Close and latch the housing door.
3. Position the monitor on a vertical surface at eye level (4 1/2 to 5 feet from the floor).
4. The Beacon 200 is shipped with the mounting feet positioned behind the housing. Loosen the screws that secure the feet to the housing, rotate the feet to their mounting position (as shown in Figure 4), then tighten the screws.
5. Insert 1/4 in. or 5/16 in. screws through the slots in the mounting feet at each corner of the housing to secure the housing to the mounting surface (see Figure 4).

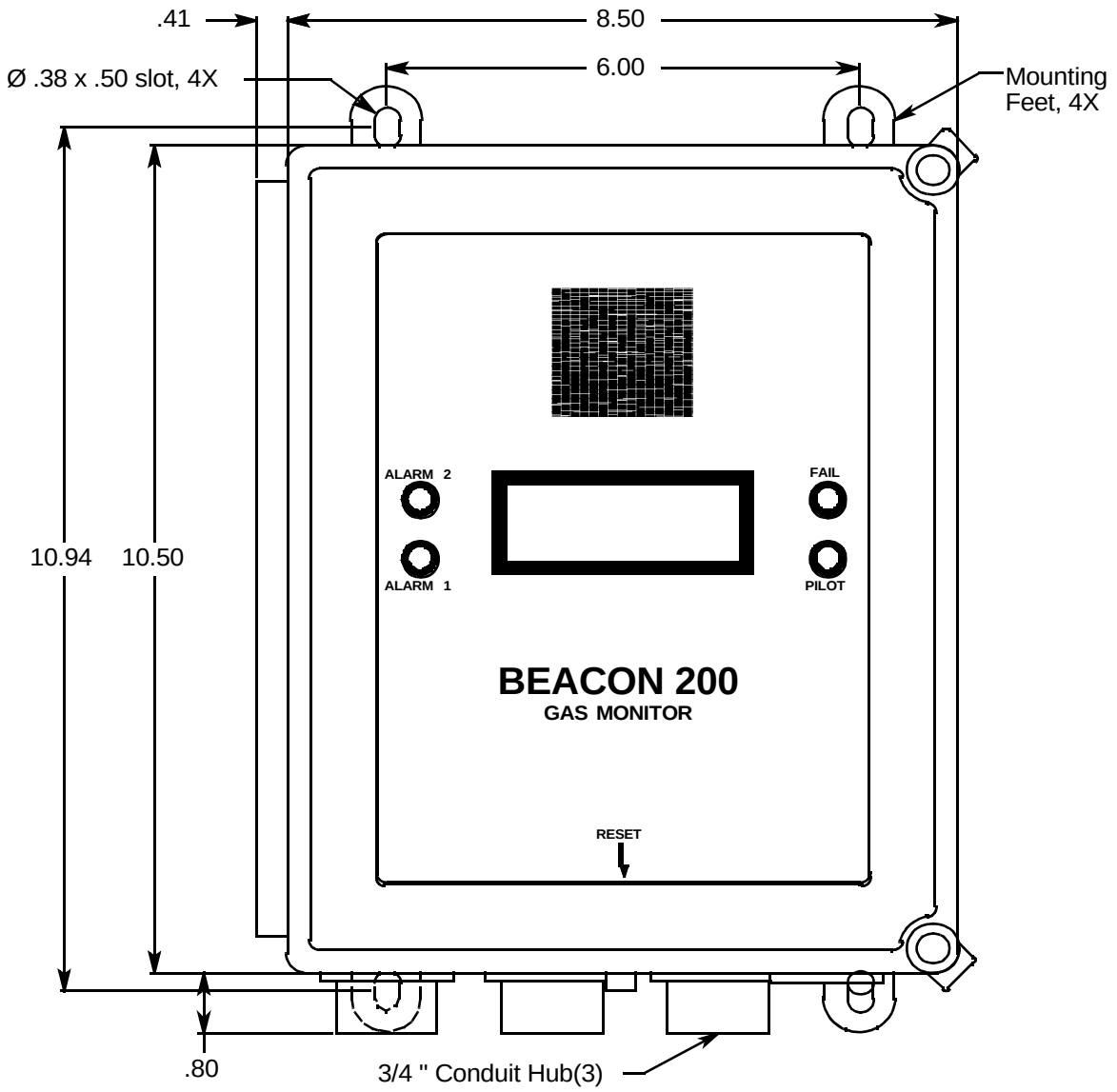

Figure 4. Beacon 200 Gas Monitor Outline and Mounting Dimensions

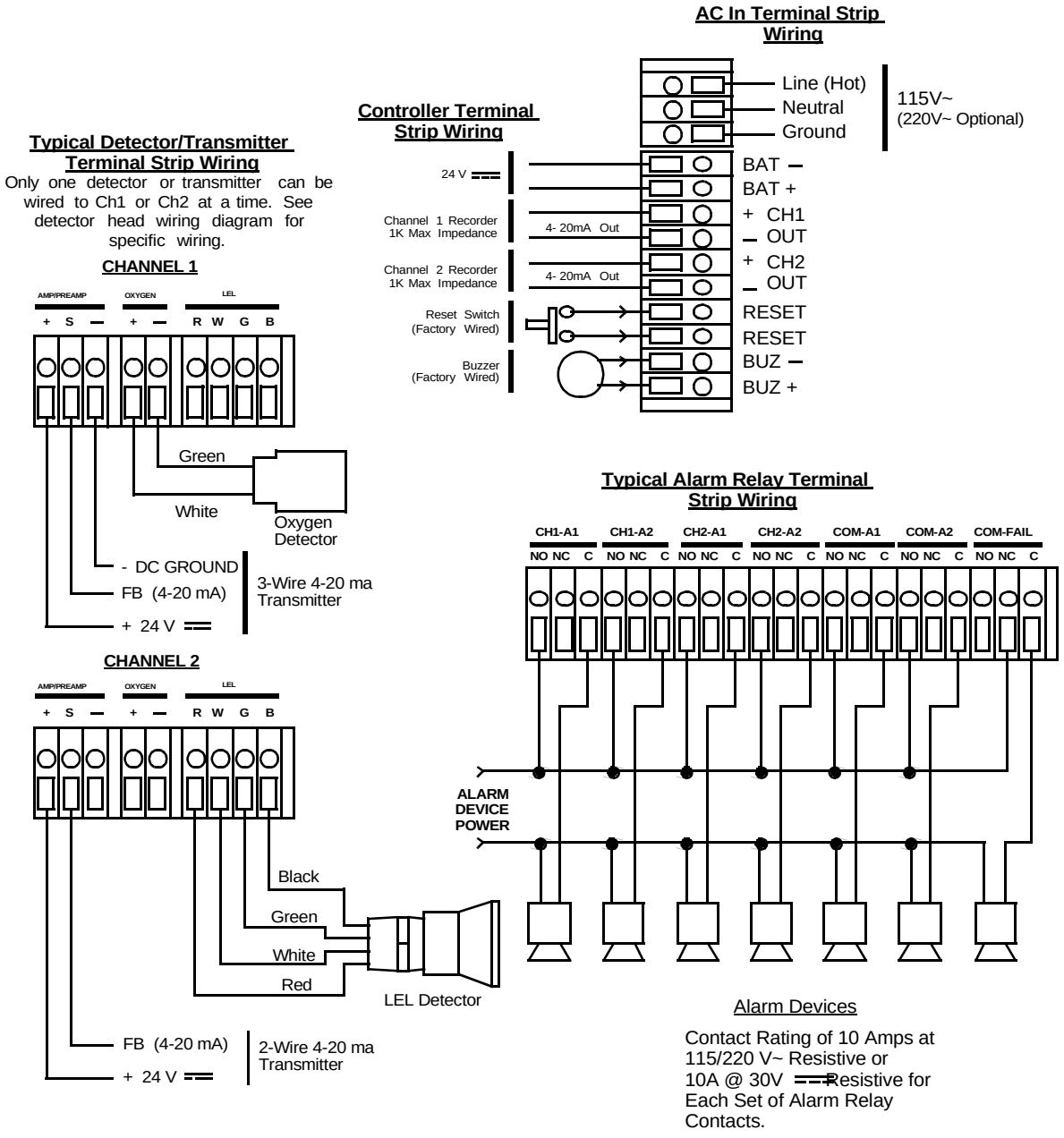

Figure 5. Beacon 200 Gas Monitor General External Wiring Diagram

Wiring the Beacon 200 Gas Monitor

This section describes procedures to connect the AC power source, DC power source, external alarm(s), recorder, and detector head(s). See Figure 5 for a general wiring diagram of all external wiring to the Beacon 200.

WARNING: Make all connections to the Beacon 200 before you plug in or turn on the AC or DC power source. Before you make any wiring adjustments, always verify that all power sources are not live.

Connecting the AC Power Source

NOTE: If you are using DC power as the primary power source, go to the next section, “Connecting the DC Power Source.”

The AC in terminal strip will accept 24 - 14 AWG wire. When selecting wire to connect the AC power source to the Beacon 200, be sure to meet the local electrical code. Also be sure to use an appropriate circuit breaker in the AC line close to the Beacon 200 that meets the local electrical code.

Perform the following procedure to connect the AC power source to the Beacon 200.

WARNING: Verify that the power source is unplugged or turned off at the power source end before you continue with this procedure.

1. Turn off or unplug all incoming power to the Beacon 200 at the power source end.
2. Open the housing door, then place the power switch in the OFF position.
3. Install an appropriately rated cable bushing or conduit to the right-most conduit hub on the bottom of the Beacon 200 housing.
4. Locate the 3-point AC in terminal strip (see Figure 1). The terminals are labelled LINE, NEUT, and GND.
5. Guide the AC power cord or wires through the right-most conduit hub on the bottom of the Beacon 200 housing.

CAUTION: *Do not route power and detector head wiring through the same conduit hub. The power wiring may disrupt the transmission of the detector head signal to the monitor.*

6. Connect the AC wires to the AC power terminal strip as shown in Figure 6.

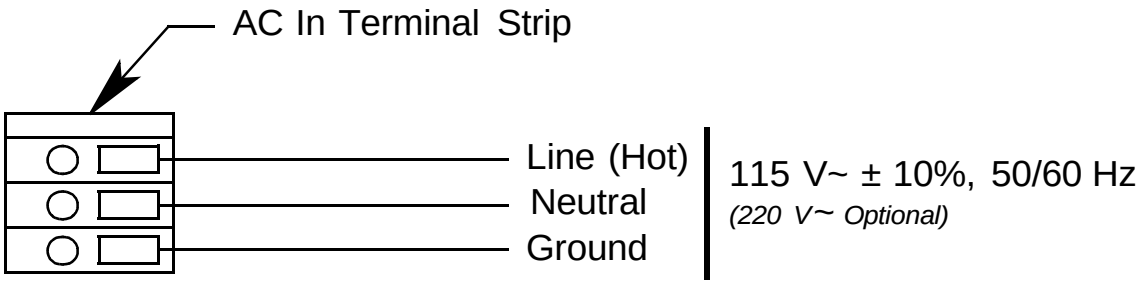

Figure 6. AC Power Wiring

Connecting the DC Power Source

WARNING: ***Verify that the power source is unplugged or turned off at the power source end before you continue with this procedure.***

DC power may be used as a primary power source. It may also be used as a backup power source with a 24 VDC battery if AC power is the primary power source. If DC power is the **primary** power source, **DO NOT** connect AC power.

1. Turn off or unplug all incoming power to the Beacon 200 at the power source end.
2. Open the housing door, then place the power switch in the OFF position.Locate the DC power terminals on the controller terminal strip (see Figure 1). They are labelled BAT - and BAT +
3. Install an appropriately rated cable bushing or conduit to one of the unused conduit hubs on the bottom of the Beacon 200 housing.
4. Guide a DC power cord or wires through the selected conduit hub.

CAUTION: *Do not route power and detector head wiring through the same conduit hub. The power wiring may disrupt the transmission of the detector head signal to the monitor.*

CAUTION: *When a battery is used as backup power, the Beacon 200 trickle charges the battery. Do not use a non-rechargeable battery as backup power. Use RKI backup battery 49-8102RK or an appropriately rated rechargeable lead acid type battery.*

5. Connect the DC wires to the controller terminal strip as shown in Figure 7.

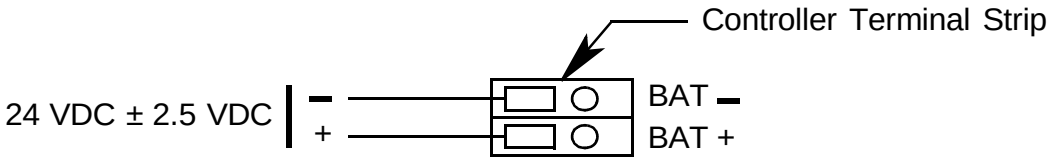

Figure 7. DC Power Wiring

NOTE: If a 24 VDC battery is used as a **backup** power source, as long as AC power is on the Beacon 200 will keep a trickle charge on the battery to maintain its charge. If AC power is interrupted, the Beacon 200 will operate from the DC backup battery until the battery voltage drops to 21.5 volts or less, or until AC power is restored. Battery recharge time will vary depending on how much the battery was drained.

Connecting External Alarms

Perform the following procedure to connect external alarm devices to the Beacon 200.

NOTE: The alarm terminal strip includes terminals for **channel** alarms and **common** alarms. Channel alarms are activated by one particular channel. Common alarms are activated by either of the two channels.The example used in this procedure describes connecting an external alarm device to one of the channel alarm terminals: the channel 1, alarm 1 terminals.

1. Turn off or unplug all incoming power to the Beacon 200 at the power source end.
2. Open the housing door, then place the power switch in the OFF position.Locate the alarm terminal strip (see Figure 1).
3. Install an appropriately rated cable bushing or conduit in an unused conduit hub on the bottom of the Beacon 200 housing.

4. Guide the wiring of the external alarm device through the selected conduit hub on the bottom of the Beacon 200 housing.

CAUTION: *Do not route the external alarm wiring and detector head wiring through the same conduit hub. The external alarm wiring may disrupt the transmission of the detector signal to the Beacon 200.*

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5. Connect the leads from the external alarm device and power to the alarm terminals as shown in Figure 8.

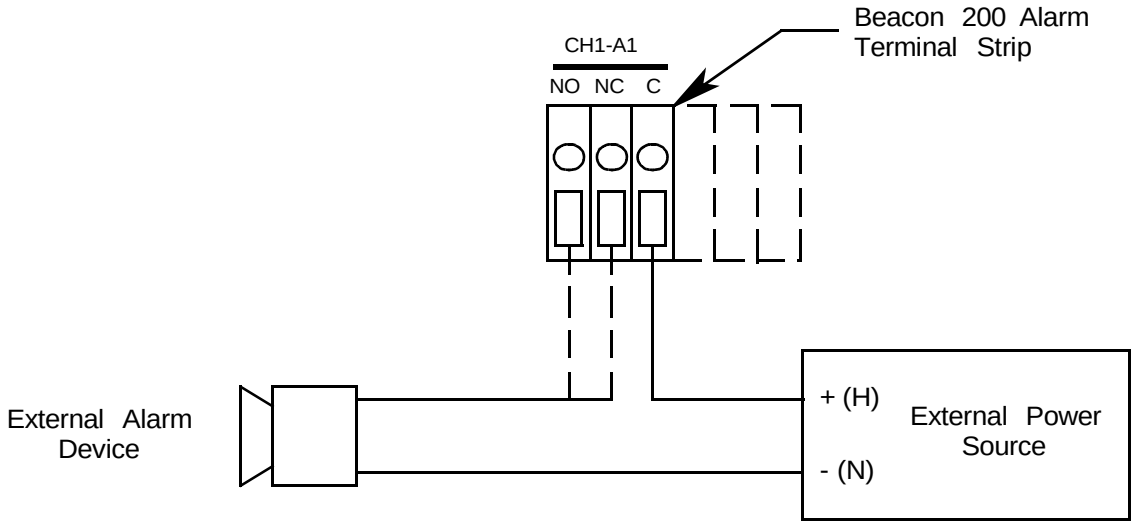

Figure 8. Typical External Alarm Wiring

6. Repeat steps 3 and 4 for additional external alarm devices.

Connecting a Recorder

Perform the following procedure to connect an analog recording device tot he Beacon 200. The output at the recorder output terminals is a 4 - 20 mA signal that is proportional to the detection range of the applicable detector head.

1. Turn off or unplug all incoming power to the Beacon 200 at the power source end.
2. Open the housing door, then place the power switch in the OFF position. Locate the recorder output terminals on the controller terminal strip (see Figure 1).
3. Install an appropriately rated cable bushing or conduit in an unused conduit hub on the bottom of the Beacon 200 housing.

4. Guide the wiring from the recording device through the selected conduit hub on the Beacon 200.
5. Connect the wires form the recording device to the recorder output terminals as shown in Figure 9.

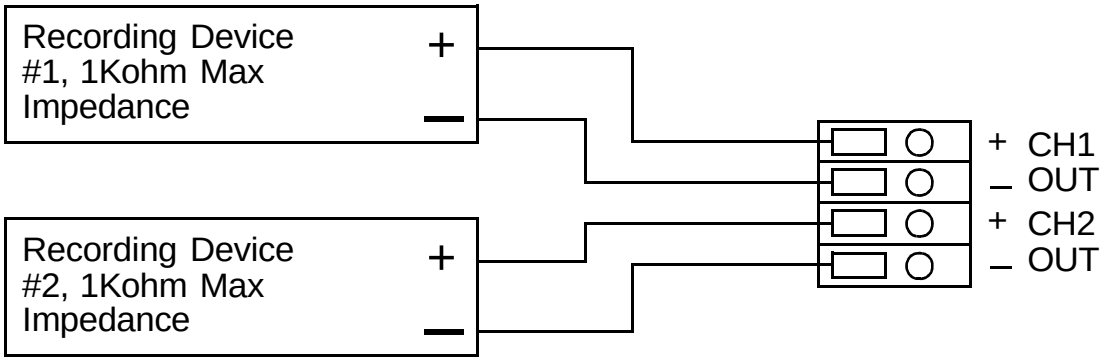

Figure 9. Recorder Output Wiring

Connecting RKI Detector Heads

Perform the following procedure to connect an RKI detector head to the Beacon 200.

1. Turn off Power to the Beacon 200 at the power source.
2. Open the Beacon 200 door and place the power switch in the off position.
3. See the detector head instruction manual for instructions on how to connect wires to the detector head.
4. Install an appropriately rated cable bushing or conduit in an unused conduit hub on the bottom of the Beacon 200 housing.
5. Route the wires in conduit or shielded cable from the detector head through the selected conduit hub into the Beacon 200. See Table 5 below for wire size and distance guidelines.

   Unshielded twisted pair cable in conduit or shielded twisted pair cable is recommended for all the direct connect detector heads. For the LEL detector, pair the **R** & **B** wires and the **W** & **G** wires. Shielded cable or wires in conduit are recommended for the 2-wire and 3-wire 4 - 20 mA transmitters.
6. Connect the wires from the detector head to the appropriate detector/ transmitter terminals. The top detector terminal strip is for channel 1 and the bottom one is for channel 2. See the detector head instruction manual for controller terminal connections.

CAUTION: *Do not route power and detector head wiring through the same conduit hub. The power wiring may disrupt the transmission of the detector head's to the Beacon 200.*

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Table 5: Wire Size Guidelines for RKI Detector Head Wiring

Detector Head Type	Number of Wires to Controller	Max Distance to Controller w/18 Gauge Wire	Max Distance to Controller w/16 Gauge Wire	Max Distance to Controller w/14 Gauge Wire
Direct Connect LEL	4	500 ft.	1,000 ft.	2,000 ft.
Direct Connect Oxygen	2	500 ft.	1,000 ft.	2,000 ft.
Direct Connect H2S	2	500 ft.	1,000 ft.	2,000 ft.
Direct Connect CO	2	500 ft.	1,000 ft.	2,000 ft.
Direct Connect Cl2	2	500 ft.	1,000 ft.	2,000 ft.
Direct Connect SO2	2	500 ft.	1,000 ft.	2,000 ft.
2-Wire 4 - 20 mA Transmitter	2	2,500 ft.	5,000 ft.	8,000 ft.
3-Wire 4 - 20 mA Transmitter	3	2,500 ft.	5,000 ft.	8,000 ft.

Connecting User-Supplied 4 - 20 mA Transmitters

The Beacon 200 may be used with a user supplied 2-wire or 3-wire 4 - 20 mA transmitter which runs on 24 VDC. When this is done, the Beacon 200 is normally setup at RKI Instruments with the following channel parameters: unit of measure, item name, and full scale. For example, "PSI AIR" with a full scale of 10 PSI.

Perform the following procedure to connect a 4 - 20 mA transmitter, which you supply, to the Beacon 200.

1. Turn off power to the Beacon 200 at the power source.
2. Open the Beacon 200 door and turn off the power switch.
3. See the transmitter's instruction manual for instructions on how to connect wires to the transmitter.
4. Install an appropriately rated cable bushing or conduit in an unused conduit hub on the bottom of the Beacon 200 housing.
5. Route the wires from the transmitter through the selected conduit hub into the Beacon 200.

6. Connect the wires from the transmitter to the appropriate detector/ transmitter terminals. The top detector terminal strip is for channel 1 and the bottom one is for channel 2. See the transmitter instruction manual for controller terminal connections. Figure 10 below illustrates typical transmitter wiring connections.

CAUTION: *Do not route power and transmitter wiring through the same conduit hub. The power wiring may disrupt the transmission of the transmitter's signal to the Beacon 200.*

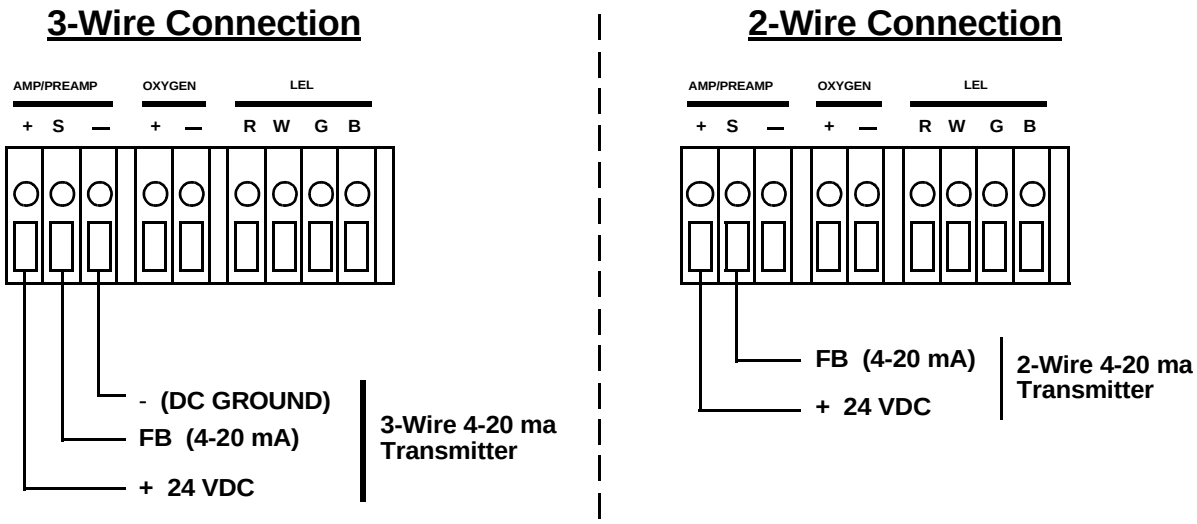

Figure 10. Generic 4 to 20 mA Transmitter Output Wiring

Starting Up the Beacon 200 Gas Monitor

Perform the following procedure to place the Beacon 200 into normal operation.

1. Complete the mounting and wiring procedures described earlier in this chapter.
2. Complete all installation procedures described in the detector head or user supplied 4 - 20 mA transmitter instruction manual.
3. Verify that all wiring connections are correct and secure and that the Beacon 200's power switch is in the OFF position.
4. Plug in or turn on the incoming power source (AC or DC) at the power source end.
5. Place the Beacon 200's power switch in the ON position. **RKI INSTRUMENTS BEACON 200** appears on the display for a few seconds, then **WARMING UP** appears for each active channel. The warm-up period will last for one minute.

NOTE: To prevent unwanted alarms during warm up, the alarm circuits are not active while the **WARMING UP** message is displayed.

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6. Verify that the PILOT light is on. If the PILOT light is not on, see the troubleshooting guide in Chapter 5, Maintenance.
7. Perform the start-up procedure for each detector head or user supplied 4 - 20 mA transmitter as described in the detector head or transmitter instruction manual

Chapter 4: Operation

Overview

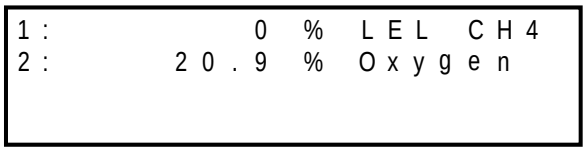
This chapter describes the Beacon 200 Gas Monitor in normal operation. This chapter also describes the Beacon 200 in alarm 1, alarm 2, and fail conditions and suggests response to these conditions.

Normal Operation

Normal operation is defined as follows:

- The start-up procedure is complete.
- The Beacon 200 is not indicating an alarm 1, alarm 2, or fail condition.
- The Beacon 200 is not running the Channel Control & Setup or Calibration Programs.

During normal operation, the Beacon 200 simultaneously displays the current gas reading, unit of measure, and target gas for each active channel.



The PILOT light is on during normal operation indicating that the Beacon 200 is receiving incoming power.

Recorder Output Operation

The output at the recorder output terminals is a 4 - 20 mA signal for each active channel that is proportional to the detection range of the channel. A channel that is set as CHANNEL NOT USED or CHANNEL DISABLED in the Channel Control & Setup Program (see Chapter 5) has an output of 0 mA.

There are several special circumstances where the recorder output will behave as follows:

- When a channel is in WARMUP after the Beacon 200 is turned on, the recorder output will be at 4 mA for all channel types except oxygen. For oxygen channels, the output will be 17.4 mA while in WARMUP.
- If the Beacon 200 is being powered by a battery and is in low battery alarm, the recorder output for each channel will be 0 mA.
- When a channel is added or a channel type changed, the display will indicate NEEDS CALIBRATION for that channel when the Beacon 200 is first turned on and will continue to indicate this until the channel is calibrated. In this situation, the recorder output will be at 3.2 mA until the channel is calibrated.
- If a channel goes into a fail condition, the recorder output will be 0 mA.
- If you enter any of the instrument programs, such as the Calibration Program, the recorder output will hold at the value it was at when you entered the program was entered until you return to normal operation.

Alarm Indications

This section describes the Beacon 200 in alarm 1, alarm 2, and fail conditions and suggests response to these conditions. Table 6 below lists the alarm indications for each condition.

NOTE: The Beacon 200 includes alarm on and alarm off delay settings for each channel and level of gas alarm. The alarm indications described in this section operate according to the factory set delay settings. See the Configure Channel Settings Menu section of Chapter 5 for all the factory settings.

Table 6: Visual and Audible Alarm Indications

Condition	Cause	Visual Indication(s)	Audible Indication
Alarm 1[1]	Increasing (decreasing for O_2) gas reading at or above the alarm 1 setpoint	• ALARM 1 light is on • Gas reading flashes and alternates with **ALARM-1** message	Pulsing tone
Alarm 2[1]	Increasing gas reading at or above the alarm 2 setpoint	• ALARM 2 light is on • Gas reading flashes and alternates with **ALARM-2** message	Pulsing tone
Fail	• Disconnected or misconnected detector wiring • Display reading below -10% of full scale or lower • Defective components	• FAIL light is on • **FAIL** message flashes in place of gas reading	Steady tone
Low Battery[2]	No AC power **and** DC power source (primary or backup) less than 21.5 volts.	• FAIL light is on • **SUPPLY VOLTAGE IS TOO LOW LOW POWER STANDBY** message and actual voltage of incoming DC power	None

* *[1]If the Beacon 200 is in both an alarm 1 and an alarm 2 condition, both alarm lights are on and the display alternates between the gas reading and the ALARM-1 ALARM-2 message.*

* *[2]If DC power is used as primary or backup power source.*

NOTE: You can select normally energized (NE) or normally de-energized (NDE) channel relay settings in the Channel Control & Setup menu. The following sections describe the default setting for the channel relays which is NDE.

Common alarm 1 and alarm 2 relays are factory-set as NDE, and the common fail relay is factory set as NE. The common relays' NE/NDE settings are not user-adjustable.

Alarm 1 Condition

This section describes the audible and visual indications for an alarm 1 condition and suggests response to an alarm 1 condition.

Alarm 1 condition indications

When the gas reading of an active channel reaches the alarm 1 setpoint, the Beacon 200 senses an alarm 1 condition. The Beacon 200 alerts you to an alarm 1 condition as follows:

- The ALARM 1 light turns on.
- The gas reading in alarm 1 condition flashes and alternates with the **ALARM-1** message.
- The buzzer sounds a Pulsing tone.
- The common alarm 1 relay energizes.
- The applicable alarm 1 channel relay energizes.

Responding to an alarm 1 condition

This section suggests response to an alarm 1 condition.

1. Follow your established procedure for a low level combustible or toxic gas condition or a decreasing oxygen content condition.
2. Oxygen alarms are self-resetting and will automatically clear when the oxygen rises above the alarm 1 setpoint.
3. Alarms for all other gas types are latching. After the gas reading falls below the alarm 1 setpoint, press the reset switch to reset the alarm 1 circuit. Resetting the alarm 1 circuit silences the buzzer, turns off the ALARM 1 light, resets the channel display, and de-energizes the common and channel alarm 1 relays.

NOTE: To silence the buzzer while in an alarm 1 condition, press the reset switch.

You cannot de-energize the alarm 1 relays until the gas reading falls below (above for oxygen) the alarm 1 setpoint.

Alarm 2 Condition

This section describes the audible and visual indications for an alarm 2 condition and suggests response to an alarm 2 condition.

Alarm 2 condition indications

When the gas reading of an active channel reaches the alarm 2 setpoint, the Beacon 200 senses an alarm 2 condition. The Beacon 200 alerts you to an alarm 2 condition as follows:

- The ALARM 2 light turns on.
- The gas reading in alarm 2 condition continues to flash and alternates with the **ALARM-2** messages.
- The buzzer sounds a Pulsing tone.
- The common alarm 2 relay energizes.
- The applicable alarm 2 channel relay energizes.

Responding to an alarm 2 condition

This section suggests response to an alarm 2 condition.

1. Follow your established procedure for a high level combustible or toxic gas condition or an increasing oxygen content condition.
2. Oxygen alarms are self-resetting and will automatically clear when the oxygen rises above the alarm 2 setpoint.
3. Alarms for all other gas types are latching. After the gas reading falls below the alarm 2 setpoint, press the reset switch to reset the alarm circuit. Resetting the alarm circuit turns off the ALARM 2 light, and de-energizes the common and channel alarm 2 relays.

NOTE: To silence the buzzer while in an alarm 2 condition, press the reset switch.

You cannot de-energize the alarm 2 relays until the gas reading falls below the alarm 2 setpoint.

Fail Condition

This section describes the audible and visual indications for a fail condition and suggests response to a fail condition.

Fail condition indications

The Beacon 200 senses a fail condition for any of the following:

- The detector head wiring to the Beacon 200 is disconnected or

incorrectly connected.

- The detector head's detector is disconnected or incorrectly connected.
- The display reading is -10% of full scale or lower.
- The Beacon 200 or detector head is malfunctioning.

When the Beacon 200 senses a fail condition, it alerts you as follows:

- The FAIL light turns on.
- The gas reading for the failing channel is replaced by the **FAIL** message.
- The buzzer sounds a steady tone.
- The common fail relay de-energizes.

NOTE: If you elected to use the channel's alarm 2 relay as an individual fail relay in the Channel Control & Setup menu, the relay de-energizes in a fail condition. See the Channel Control & Setup section of Chapter 5 for a description of this setting.

Responding to a fail condition

This section suggests response to a fail condition.

1. Verify that the detector head wiring to the Beacon 200 is correctly and securely connected.
2. Verify that the detector head's detector is correctly and securely connected.
3. See the troubleshooting guide in the detector head instruction manual.

Low Battery Condition

This section describes the audible and visual indications for a low battery condition and suggests response to a low battery condition. This condition only applies when DC power is used as a primary or backup power source.

NOTE: When a 24 VDC battery is used as a backup power source, the Beacon 200 keeps the battery charged by providing a trickle charge from the AC power source. If AC power is interrupted, the Beacon 200 will operate from the DC backup battery until the battery voltage drops to 21.5 volts or less, or until AC power is restored.

Low battery condition indications

The Beacon 200 senses a low battery condition when:

- AC power is disconnected, misconnected, or interrupted

AND

- the DC power source is 21.5 volts or less

When the Beacon 200 senses a low battery condition, it alerts you as follows:

- The FAIL light turns on.
- The top display screen displays the **SUPPLY VOLTAGE IS TOO LOW, LOW POWER STANDBY** message and the actual voltage of incoming DC power.

Responding to a low battery condition

This section suggests response to a low battery condition.

- If DC power is the **primary** power source:

1. For a *temporary* DC power source, disconnect primary DC power at the Beacon 200, then connect a 24 VDC backup battery.
2. Determine and correct the cause of primary DC power loss.

   When the DC power source rises above 22.0 volts, the Beacon 200 begins the warm up process.

- If DC power is the **backup** power source:

1. Replace or recharge the 24 VDC backup battery to resume backup power capability.
2. Determine and correct the cause of primary AC power loss.

   When backup DC or primary AC power is restored, the Beacon 200 begins the warm up process. When AC power is restored, the Beacon 200 charges the backup battery until it is fully recharged. Charge time varies depending on the battery size and how much the battery was depleted. Once the battery is fully charged, the Beacon 200 reverts to a trickle charge to maintain the battery charge.

Viewing & Resetting Min/Max Readings

The Reset switch may be used to view and reset the minimum and maximum gas readings for the active channel(s).

1. While the Beacon 200 is in normal operation, press and hold the Reset switch button for 3 seconds.
2. The display will indicate **MIN / MAX Display Press RESET when done viewing . . .** for 5 seconds before displaying the minimum and maximum readings for the active channel(s). The minimum reading is on the left and the maximum is on the right side of the display for each channel.
3. Press and release the Reset switch button to exit the min/max screen. The display will indicate **To RESET Min/MAX values Press and HOLD RESET Button** for 10 seconds and then return to normal operation.
    - To return to normal operation without resetting the minimum and maximum readings, do not press the Reset switch button and allow the unit to return to normal operation.
    - To reset the minimum and maximum readings, before the unit returns to normal operation press and hold the Reset switch button until the display indicates **Min/Max Values Have Been Reset.** Release the Reset switch button.The unit will then return to normal operation.

Chapter 5: Channel Control and Setup Program

Overview

The Channel Control & Setup Program allows viewing of and changes to instrument setup parameters. It is accessed using the program buttons. The Channel Control & Setup Program includes three menus as described in Table 7.

Table 7: Channel Control & Setup Program Menus

Menu	Function
Enable/Disable Channel(s)	Configures channels as enabled, disabled, or not used
Configure Channel Settings	Configures alarm settings, noise filter setting, and zero suppression setting for each channel
View System Information	Displays the firmware version number and the instrument operating voltage

To enter the Channel Control & Setup Program, simultaneously press and hold the ESCAPE and ENTER buttons for approximately 5 seconds.

The Channel Control & Setup Program menu includes a 5-minute time-out feature. If you do not press a button for 5 minutes, the Beacon 200 automatically returns to normal operation.

NOTE: If the Beacon 200 returns to normal operation because of a program time-out, the active channels enter a warm-up period just as they do when the unit is first turned on.

If you are installing a new system, the channels have been setup at the factory for the ordered detector heads. Use the Channel Control & Setup Program only if you want to disable or enable a channel, delete a channel, or change channel settings. If a channel is being added or a channel is being changed from one type to another, contact RKI Instruments, Inc. for additional documentation required to define the channel type.

Enable/Disable Channel(s) Menu

1. From normal operation, simultaneously press and hold the ESCAPE and ENTER buttons for approximately 5 seconds to enter the Channel Control & Setup Program. Release the buttons when the **Control & Setup Program Proceed? [YES] or [NO]** message appears on the display screen.
2. Press the UP/YES button to continue.
3. Press the UP/YES or DOWN/NO button until the **1) Enable/Disable Channel(s)** message appears on the display screen, then press the ENTER button.
4. Use the UP/YES and DOWN/NO buttons to select the channel you want to enable or disable, then press the ENTER button.
5. Press the DOWN/NO button. The CHANNEL USAGE setting displays on the display screen.
6. Use the UP/YES and DOWN/NO buttons to display the setting you want, then press the ENTER button to select the setting. The table below describes the three available settings.

Table 8: Beacon 200 Channel Usage Settings

Setting	Description
CHANNEL ENABLED	The Beacon 200 displays gas readings and initiates gas and channel failure alarms when appropriate. Use this setting for normal operation when the channel has a detector head wired to it.
CHANNEL DISABLED	The Beacon 200 displays **DISABLED** for the channel and the channel's alarm circuit is **not** active. Use this setting when the channel has a detector head wired to it, but gas readings and alarms are not required for the channel (for example if the detector head requires maintenance or is malfunctioning).
CHANNEL NOT USED	The Beacon 200 leaves the channel blank on the display screen. Use this setting when the channel does **not** have a detector head wired to it.

7. Press the ESCAPE button, then press the DOWN/NO button to return to normal operation.

Configure Channel Settings Menu

This section describes how to view and change channel parameters for the installed gas channels.

1. Simultaneously press and hold the ESCAPE and ENTER buttons for approximately 5 seconds to enter the Channel Control & Setup Program. Release the buttons when the **Control & Setup Program Proceed? [YES] or [NO]** message appears on the display screen.
2. Press the UP/YES button to continue.
3. Press the UP/YES or DOWN/NO button until the **2) Configure Channel Setting(s)** message appears on the display screen, then press the ENTER button.
4. Use the UP/YES and DOWN/NO buttons to select the channel for which you want to set parameters, then press the ENTER button.
5. Press the UP/YES button until the parameter you want to set appears on the display screen. The screen will display the current setting and ask if it is OK.

   Table 9 lists the parameters you can set for a channel. Table 9 also lists the factory set value for each parameter.

NOTE: Use the ESCAPE button to go back to a previously displayed parameter.

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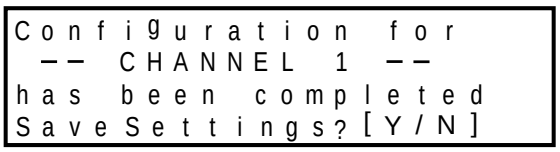
6. If the setting is not OK and you want to change the it, press the DOWN/NO button. The parameter is now adjustable.
7. Use the UP/YES or DOWN/NO button to update the parameter, then press the ENTER button to continue.
8. Repeat steps 5 through 7 to set any other channel parameters.
9. Press the UP/YES button until the following message appears on the display screen.



10. Press the UP/YES button to save the configuration. The screen will then return to the Channel Control & Setup menu.
11. Press ESCAPE to return to the screen which asks **Control & Setup Program Proceed? [YES] or [NO]**.
12. {Press the DOWN/NO button to return to normal operation.

Table 9: Channel Setting Parameters

Parameter (Factory-Set Value)	Description
ALARM-1 Level See the Beacon 200 Detector Head Specification Sheet for the detector head installed on this channel	The gas reading at which the Beacon 200 initiates an alarm 1 condition for this channel.
ALARM-1 ON DELAY (1 sec)	The amount of time the Beacon 200 delays activation of the alarm 1 circuit once an alarm 1 condition is initiated.
ALARM-1 OFF DELAY (0 sec)	The amount of time the Beacon 200 delays turning off the alarm 1 circuit once an alarm 1 condition passes.
ALARM-1 (activation) (DECREASING for oxygen channels, INCREASING for all other channel types)	Indicates if the alarm 1 circuit is activated by gas readings **INCREASING** or **DECREASING** to the ALARM-1 Level.
ALARM-1 Relay (action) (NORMALLY DE-ENERGIZED)	If set as **NORMALLY DE-ENERGIZED**, the channel's alarm 1 relay is de-energized in normal operation and energizes when an alarm 1 condition is initiated. If set as **NORMALLY ENERGIZED**, the channel's alarm 1 relay is energized in normal operation and de-energizes when an alarm 1 condition is initiated.
ALARM-1 Relay (reset) (SELF RESETTING for oxygen, LATCHING for all other channel types)	If set as **LATCHING**, you must press the RESET button to reset the alarm 1 circuit after the alarm 1 condition passes. If set as **SELF RESETTING**, the Beacon 200 automatically resets the alarm 1 circuit after the alarm 1 condition passes.
ALARM-2 Relay (used for) (ALARM-2 Condition)	If set as **ALARM-2 Condition**, the channel's alarm 2 relay activates when an alarm 2 condition is initiated for the channel. If set as **FAIL Condition**, the channel's alarm 2 relay activates when a fail condition is initiated for the channel.
ALARM-2 Level See the Beacon 200 Detector Head Specification Sheet for the detector head installed on this channel	The gas reading at which the Beacon 200 initiates an alarm 2 condition for this channel.
ALARM-2 ON DELAY (2 min for oxygen, 1 sec for all other channel types)	The amount of time the Beacon 200 delays activation of the alarm 2 circuit once an alarm 2 condition is initiated.
ALARM-2 OFF DELAY (0 sec)	The amount of time the Beacon 200 delays turning off the alarm 2 circuit once an alarm 2 condition passes.

Table 9: Channel Setting Parameters (Continued)

Parameter (Factory-Set Value)	Description
ALARM-2 (activation) (INCREASING)	Indicates if the alarm 2 circuit is activated by gas readings **INCREASING** or **DECREASING** to the ALARM-2 Level.
ALARM-2 Relay (action) (NORMALLY DE-ENERGIZED)	If set as **NORMALLY DE-ENERGIZED**, the channel's alarm 2 relay is de-energized in normal operation and energizes when an alarm 2 condition is initiated. If set as **NORMALLY ENERGIZED**, the channel's alarm 2 relay is energized in normal operation and de-energizes when an alarm 2 condition is initiated.
ALARM-2 Relay (reset) (SELF RESETTING for oxygen, LATCHING for all other channel types)	If set as **LATCHING**, you must press the RESET button to reset the alarm 2 circuit after the alarm 2 condition passes. If set as **SELF RESETTING**, the Beacon 200 automatically resets the alarm 2 circuit after the alarm 2 condition passes.
NOISE FILTER (3)	The noise filter feature helps "smooth out" jumpy or noisy signals from the detector head. You can set the noise filter from 1 to 8. A setting of **8** produces the greatest amount of smoothing but also responds slowest to changes in the response reading. A setting of **1** responds fastest to changes in the response reading but produces the least amount of smoothing.
ZERO SUPPRESSION (0.0% of the **detection range** in terms of the detection units for carbon dioxide channel types, 0.5% **oxygen** for oxygen channels, 2.0% of the **detection range** in terms of the detection units for all other channel types)	The zero suppression feature helps prevent "jumpy" readings near the fresh air reading. For example, if the zero suppression setting on a %LEL channel is **2.0%** and the full scale is 100% LEL, the Beacon 200 will display a reading of 0% LEL for gas readings from -2% LEL to 2% LEL.

View System Information Menu

The View System Information Menu consists of only one display screen which indicates the version number of the firmware that is running the instrument and the system voltage. The system voltage is the voltage that is directly running the instrument's circuitry. When the unit is running from AC power, this voltage is normally 24.0 volts ± 0.2 volts. When the unit is running from DC power, this voltage reading can be used as an indication of the DC voltage powering the unit.

Chapter 6: Input Setup Program

Overview

This chapter describes how to use the Input Setup Program to add a channel or change the channel type of an installed channel on the Beacon 200. The Input Setup Program allows you to define the type of detector head, the units and gas type, and the full scale for that channel.

To enter the Input Setup Program, the Beacon 200 must first be off. While the Beacon 200 is off, press and hold the ENTER button, then turn on the Beacon 200 with the ON/OFF switch.

The Input Setup Program menu includes a 5-minute time-out feature. If you do not press a button for 5 minutes, the Beacon 200 automatically begins normal operation.

NOTE: If the Beacon 200 enters normal operation because of a program time-out, the active channels enter a warm-up period just as they do when the unit is first turned on.

Setting Up a New Channel or Changing an Existing Channel

1. While the Beacon 200 is off, press and hold the ENTER button, then turn on the Beacon 200 with the ON/OFF switch.
2. The Beacon 200 will beep repeatedly while you are holding down the ENTER button and then the screen will show **INPUT SETUP PROGRAM** on the top line.
3. Press the ENTER button to continue.

   If you press the ESCAPE button, the unit will start-up and enter its warm-up period.
4. Press the UP/YES or DOWN/NO button until the channel you wish to add or change appears on the display screen, then press the ENTER button. The detector head type screen appears.
5. The display screen indicates what type of detector head is currently selected for that channel and asks if it is OK. Table 1 below briefly describes each type.

Table 10: Beacon 200 Detector Head Types

Detector Head Type	Description
4 - 20 mA Amp [+S(-)]	A 4 - 20 mA detector head is connected to the Beacon 200 with 2 or 3 wires, depending on the detector head model, using the AMP/PREAMP +, S, and - terminals on a detector head terminal strip. All calibration adjustments are made at the detector head.
PreAmp [+S]	A PreAmp detector head is connected to the Beacon 200 with 2 wires using the AMP/PREAMP + and S terminals on a detector head terminal strip. All calibration adjustments are made at the Beacon 200.
O2 Direct [+-]	An O2 Direct detector head is an oxygen detector head in which the oxygen detector is wired to the Beacon 200 with 2 wires using the OXYGEN + and - terminals on a detector head terminal strip. All calibration adjustments are made at the Beacon 200.
LEL Direct [RWGB]	An LEL Direct detector head is a combustible gas detector head in which the combustible gas detector is wired to the Beacon 200 with 4 wires using the LEL R, W, G, and B terminals on a detector head terminal strip. All calibration adjustments are made at the Beacon 200.

If the detector head type is not correct, press the DOWN/NO button and continue with step 6.

If the detector head type is correct, press the UP/YES button to proceed to the units and gas type screen and skip to step 7.

NOTE: See the detector head operator's manual and the Beacon 200 Detector Head Specification sheet for the detector head to determine the detector head type.

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6. Use the UP/YES and DOWN/NO buttons to scroll through the list of detector head types until the correct one is displayed. Press the ENTER button to accept the type.The units and gas type screen appears.
7. If the units and gas type are not correct, press the DOWN/NO button and continue with step 8.

   If the units and gas type are correct, press the UP/YES button to proceed to the full scale screen and skip to step 9.
8. Use the UP/YES and DOWN/NO buttons to scroll through a list of units and gas type choices.

NOTE: See the Beacon 200 Detector Head Specification Sheet for the detector head to determine the correct units and gas type.

When the desired units and gas type appears, press the ENTER button to accept the choice. The full scale screen appears.

One of the choices is **User Will Specify**. If the desired units and gas type setting is not in the list, this setting will allow you to enter a 10 character units and gas type setting. With this choice displayed, press the ENTER button and a screen will appear which allows you to input the characters. Use the UP/YES and DOWN/NO buttons to select a character and then press ENTER to accept it and continue with the next character. When all characters have been entered, the full scale screen will appear.

9. If the full scale setting is not correct, press the DOWN/NO button and continue with step 10.

   If the full scale setting is correct, press the UP/YES button to proceed to the save screen and skip to step 11.
10. Use the UP/YES and DOWN/NO buttons to scroll through a list of full scale settings.

NOTE: See the Beacon 200 Detector Head Specification Sheet for the detector head to determine the correct full scale setting.

When the desired full scale setting appears, press the ENTER button to accept the setting. The save screen appears.

One of the choices is **User Will Specify**. If the desired full scale setting is not in the list, this setting will allow you to enter a full scale setting. With this choice displayed, press the ENTER button and a screen will appear which prompts you to choose how many decimal places you want in the full scale setting. You can select up to 3 decimal places, then press the ENTER button to proceed to the select full scale screen. Use the UP/YES and DOWN/NO buttons to select a full scale setting, then press ENTER to accept it. The save screen appears.

11. To save the settings, press the UP/YES button and the settings will be saved. The display will return to the first screen of the Input Setup Program.

    If you do not want to save the settings, press the DOWN/NO button. The display will return to the first screen of the Input Setup Program.

12. Press the ENTER button to perform additional setup or the ESCAPE button to exit the Input Setup Program and begin the Beacon 200's warm-up sequence.

NOTE: Once the Beacon 200 channels are configured correctly, see the detector head operator's manual(s) for a complete description of detector head installation procedures.

Chapter 7: Maintenance

Overview

This chapter describes use of the Calibration Program and corrective maintenance procedures for the Beacon 200. It includes a troubleshooting guide for problems you may encounter with the Beacon 200. Procedures to replace components of the Beacon 200 are at the end of this chapter.

Calibration Program

The Calibration Program is used to calibrate the Beacon 200's active channel(s). Since the Beacon 200 can support both direct connect (internal amp) and 4-20 mA transmitter (remote amp) detector heads, when calibrating the active channel(s) there are three possible detector head combinations:

- Direct connect detector head(s) only.

  If one or two direct connect detector heads are active, then all calibration adjustments are made at the Beacon 200 after calibration gas is applied at the detector(s).

- 4-20 mA transmitter detector head(s) only.

  If one or two 4-20 mA transmitter detector heads are active, then all calibration adjustments are made at the detector head(s) after calibration gas is applied to the detector(s).

- A direct connect and a 4-20 mA transmitter detector head.

  If one direct connect and one 4-20 mA transmitter detector head are installed, then calibration adjustments must be made at the Beacon 200 for the direct connect detector head after applying gas to its detector, and at the detector head for the 4-20 mA transmitter detector head.

Calibration Program Flow

Figures 11, 12, and 13 below illustrate the general flow of the Calibration Program for the three possible detector head combinations. See the next section, Entering the Calibration Program, for instructions to enter the Calibration Program. In general, the program screens provide instructions to guide you through the program. At any point in the calibration program, the ESCAPE key may be used to either return to the previous screen or

abort a process.

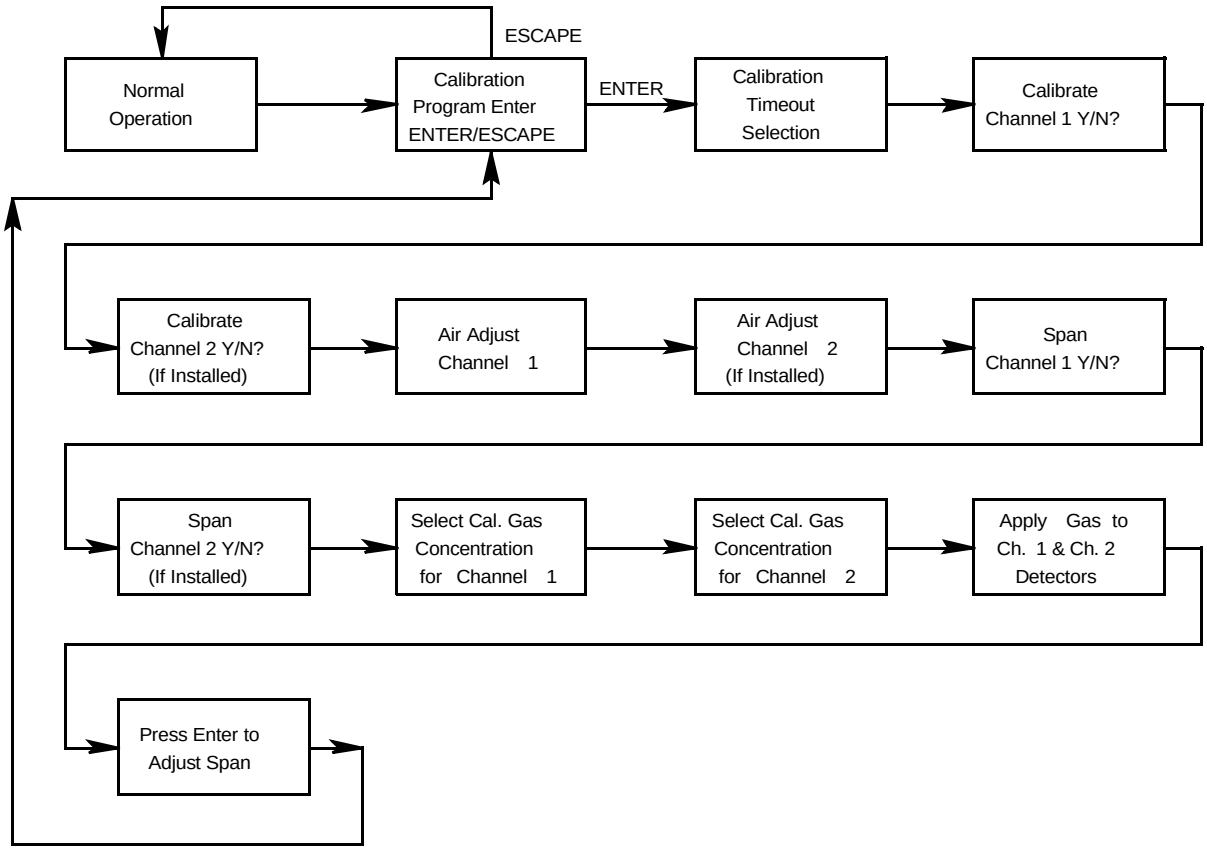

Figure 11. Direct Connect Detector Head(s) Only

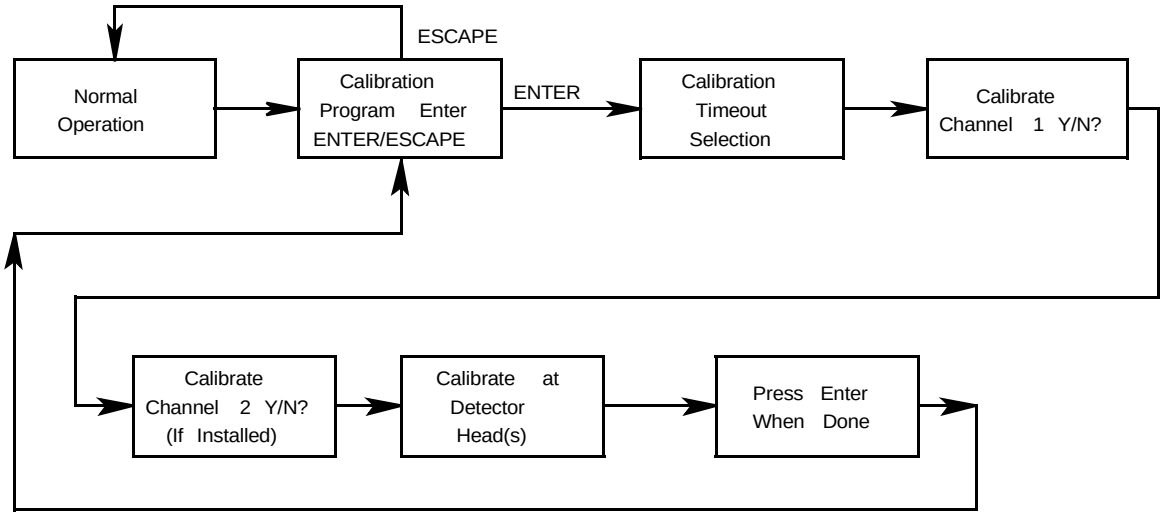

Figure 12. 4 - 20 mA Transmitter Detector Head(s) Only

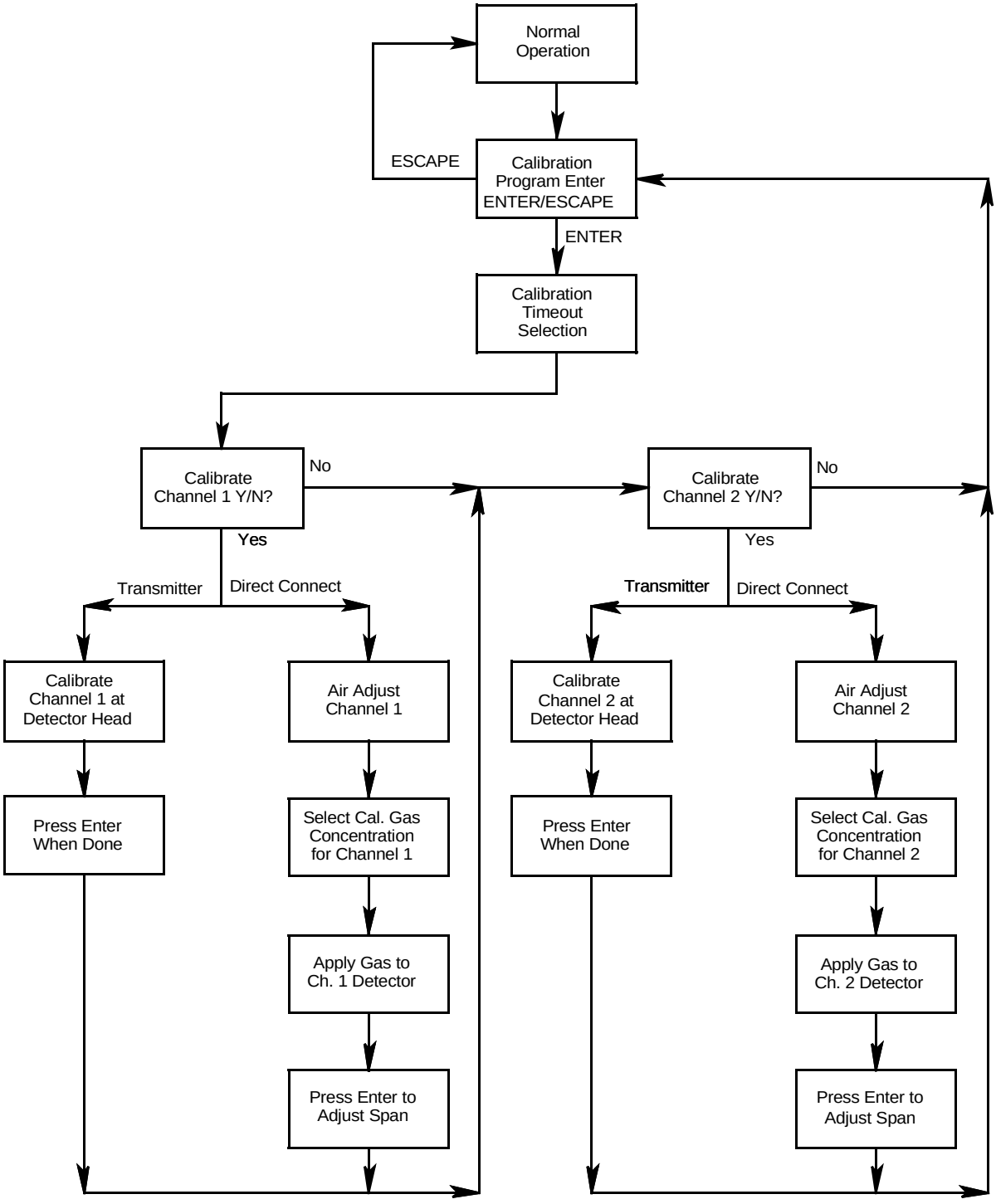

Figure 13. 4 - 20 mA & Direct Connect Detector Head(s)

Entering the Calibration Program

1. Assemble the calibration kit(s). See the instruction manual for each detector head for procedures specific to that detector head.
2. Simultaneously press and hold the ENTER and UP/YES buttons for approximately 5 seconds to enter the Calibration Program. Release the buttons when the **CALIBRATION PROGRAM...** message displays and asks if you want to continue or return to normal operation.

NOTE: While in the Calibration Program, the alarm status of the Beacon 200 will be locked in the state it was when the Calibration Program was entered.

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3. Press the ENTER button to continue and display the Calibration Time-out setting.

   The Beacon 200 will remain in the Calibration Program for the amount of time indicated by the Calibration Time-out setting or until you exit the program. If necessary, adjust the setting using the UP/YES and DOWN/NO buttons. Make sure you have allotted enough time to perform the calibration procedure. Consider the type of detector head(s) installed and the distance from the Beacon 200 when determining the time required.

NOTE: If you do not accept a Time-out setting and stay at this screen or press ESCAPE and do not press control buttons again, then the Beacon 200 will exit the Calibration Program and begin its warm-up period 5 minutes after the last button was pushed. This warm-up period functions as if the unit were just powered up.

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4. Press the ENTER button to accept the Time-out setting, start the Time-out period and continue in the Calibration Program.

NOTE: The following describes calibration with a typical channel allocation which may be different from yours. This example allocation has two active channels with both types of detector heads installed. Channel 1 is a 4-20 mA detector head and channel 2 is a direct connect detector head. See the detector head instruction manuals for calibration information and procedures specific to the detector heads.

Calibrating a 4-20 mA detector head

1. The display asks if you want to calibrate channel 1 (in this example a 4-20 mA detector head). Press the UP/YES button to continue with calibrating channel 1.

   If you press the DOWN/NO button, the display will skip channel 1 and ask if you want to calibrate channel 2.

2. If you pressed the UP/YES button, since channel 1 is a 4 - 20 mA detector head in this example, the unit will display the following message for a few seconds before continuing: **Reminder. Calibration Must Be Done at the Detector Head**. Then the display will alternate between the current gas reading for channel 1 and the message **CALIBRATE AT HEAD** above the time remaining in the calibration Time-out.
3. Verify that the detector head is in a fresh-air environment. (If necessary, use a zero-emission air cylinder, also known as zero air, to introduce a fresh-air sample when adjusting the zero reading below.)
4. Adjust the detector head's zero (fresh air reading for oxygen) reading. See the detector head's instruction manual for instructions on how to adjust the zero reading (fresh air reading for oxygen).
5. Apply calibration gas to the detector head's detector and adjust the detector head's span reading (zero reading for oxygen). See the detector head's instruction manual for instructions on how to adjust the span (zero reading for oxygen) reading.
6. Press the ENTER button to indicate that you are done with calibrating channel 1 and are ready to continue.

Calibrating a Direct Connect Detector Head

1. The display asks if you want to calibrate channel 2 (in this example a direct connect detector head). Press the UP/YES button to continue with calibrating channel 2.

   If you press the DOWN/NO button, the display will skip channel 2 and return to the first calibration program screen which asks if you want to continue or escape from the program.

2. If you pressed the UP/YES button, since channel 2 is a direct connect detector head in this example, the unit will display the following message for a few seconds before continuing: **Expose Dectector(s) To Fresh Air. . . When Done Press ENTER**. Then the display will alternate between the gas reading and the message **FRESH AIR ENTER to ACCEPT ESCAPE to ABORT** above the time remaining in the calibration Time-out.

3. If the detector is in a fresh air environment, press the ENTER button. The unit will adjust the zero reading and display the message **Fresh Air Adjust Passed for: Channel 2** before continuing.

   If you suspect the detector area is not a fresh air environment, apply zero air to the detector before pressing the ENTER button. See the detector head instruction manual for instructions to apply zero air to the detector. The Beacon 200 will freeze the display reading for channel 2 at the lowest level reached while applying zero air (highest level for an oxygen channel). After applying zero air for the required amount of time, usually two minutes, remove the zero air source from the detector. Press the ENTER button at the Beacon 200. The unit will adjust the zero reading and display the message **Fresh Air Adjust Passed for: Channel 2** before continuing.

4. The display asks if you want to perform a span (zero for an oxygen channel) operation on channel 2 by applying gas. Press the UP/YES button to continue with adjusting the span on channel 2.

   If you press the DOWN/NO button, the unit will return to the first calibration program screen which asks if you want to continue or escape from the Calibration Program.

5. If you pressed the UP/YES button, the display will prompt you for the span gas (zero gas for an oxygen channel) concentration that will be used. Adjust the displayed concentration up or down as needed using the UP/YES and DOWN/NO buttons so that it matches the concentration in the calibration cylinder.

6. Press the ENTER button to accept the calibration gas concentration and continue. The unit will display the message **Expose Dectector(s) To Gas. . . When Done Press ENTER** for a few seconds. It will then alternate between the gas reading for channel 2 and the message **APPLYING GAS ENTER to ACCEPT ESCAPE to ABORT** above the time remaining in the calibration time-out.

7. Apply the calibration gas to the detector. See the detector head instruction manual for instructions on how to apply gas to the detector.

   When the calibration gas is applied, the Beacon 200 will freeze the display gas reading at the highest level reached while the gas was applied (lowest for an oxygen channel).

8. After applying calibration gas for the required amount of time, usually two minutes, remove the gas from the detector.

9. Press the ENTER button at the Beacon 200 to proceed with the calibration adjustment.

   If the Beacon 200 is able to successfully make the calibration adjustment, it will display the message **Cal Passed for: Channel 2**. It will then return to the first calibration program screen which asks if you want to continue or escape from the program. Press ESCAPE to return to normal operation.

   If the Beacon 200 is not able to make the calibration adjustment, it will display the message **Not Enough Response! CAL Failed for: Channel 2,** then return to the first calibration program screen which asks if you want to continue or escape from the program. Press ENTER to start the calibration process again or ESCAPE to return to normal operation.

NOTE: Be sure to allow enough time between the application of calibration gas and returning to normal operation for the gas reading to return to normal levels to avoid false alarms. The alarm circuits are active when the Beacon 200 returns to normal operation.

Replacing the Fuses

The Beacon 200 includes three fuses: one DC and two AC fuses. To replace other components of the Beacon 200, contact RKI Instruments, Inc., for further information.

1. Turn off or unplug all incoming power to the Beacon 200 at the power source end.
2. Open the housing door of the Beacon 200, then place the power switch in the OFF position.
3. Locate the vertical fuse holders on either side of the power switch.

   The DC fuse which is labelled F1 on the PCB silk-screen is on the left of the power switch. The AC fuses are labelled F2 and F3 and are on the right of the power switch.
4. Use a flat-blade screwdriver to rotate the applicable fuse holder 1/4 turn counterclockwise. The fuse holder releases from the socket.

5. Remove the fuse holder from the socket, then remove the fuse from the fuse holder.

CAUTION: *Verify that the replacement fuse is the same type and rating as the fuse you are replacing.*

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6. Install the appropriate replacement fuse in the fuse holder, then place the fuse holder in the socket.
7. Push the fuse holder into the socket, then turn the holder 1/4 turn clockwise to secure it in the socket.
8. Plug in or turn on all incoming power to the Beacon 200 at the power source end.
9. Place the Beacon 200's power switch in the ON position, then verify that the PILOT light is on.
10. Close and secure the housing door.

Preventive Maintenance

Preventive maintenance of the Beacon 200 consists of daily, monthly, and quarterly procedures to ensure that the detector head is operating properly. See the detector head instruction manual(s) for preventive maintenance procedures that apply to the detector head(s)) supplied with your Beacon 200.

Troubleshooting

The troubleshooting guide describes symptoms, probable causes, and recommended action for problems you may encounter with the Beacon 200.

NOTE: This troubleshooting guide describes controller problems only. See the detector head instruction manual(s) for trouble shooting procedures that apply to the detector head(s) supplied with your Beacon 200.

Table 11: Troubleshooting the Beacon 200

Condition	Symptom(s)	Probable Causes	Recommended Action
No Power	• The PILOT light is off. • The display screens are blank.	• The power wiring is disconnected or misconnected. • One or both AC fuses or the DC fuse is blown. • The display cable is disconnected or misconnected.	1. Verify that the wiring to the power source is correct and secure. 2. At the Beacon 200, verify that the wiring to the AC terminals is correct and secure. 3. Check the continuity of the applicable (AC or DC) fuse. 4. Verify that the display cable is connected. The display (ribbon) cable plugs into connectors on the top edge of the display board (labeled **J1**) and on the top edge of the main circuit board (also labelled **J1**). 5. If the power difficulties continue, contact RKI for further instruction.
Frequent or Suspect Alarms	• The Beacon 200 alerts you to frequent or suspect alarms. • The detector head's fresh air readings remain on zero (20.9 for oxygen).	• The Beacon 200 is experiencing false readings due to RFI or EMI. • The detector head wiring is disconnected, misconnected, or intermittent.	1. Verify that the detector head wiring is properly shielded (see the detector head instruction manual.) 2. Verify that the detector head wiring is correct and secure. 3. Verify that power and detector head wiring is routed through separate conduit hubs on the bottom of the Beacon 200 housing. 4. Increase the alarm on delay setting in the Channel Control & Setup Program. 5. If the frequent or suspect alarm difficulties continue, contact RKI for further instruction.
Flickering Display	• The display readings flicker often.	• The Beacon 200 is experiencing false readings due to RFI or EMI. • The noise filter setting is too low. • The zero suppression setting is too low. • The display screen is malfunctioning.	1. Verify that the detector head wiring is properly shielded (see the detector head instruction manual.) 2. Verify that the detector head wiring is correct and secure. 3. Verify that power and detector head wiring is routed through separate conduit hubs on the bottom of the Beacon 200 housing. 4. Increase the noise filter setting in the Channel Control & Setup Program. 5. Increase the zero suppression setting in the Channel Control & Setup Program 6. If the display difficulties continue, contact RKI for further instruction.

Table 11: Troubleshooting the Beacon 200 (Continued)

Condition	Symptom(s)	Probable Causes	Recommended Action
Buzzer not Working	• The buzzer does not sound an audible alarm during alarm conditions. • The buzzer sounds weak or broken.	• The buzzer is disconnected or misconnected. • The buzzer is malfunctioning.	1. Verify that the wiring to the **BUZ-** and **BUZ+** terminals of the controller terminal strip is correct and secure. 2. If the buzzer difficulties continue, contact RKI for further instruction.
Reset Switch not Working	• The buzzer does not silence when you press the reset switch. • The applicable alarm circuit does not reset when you press the reset switch after an alarm condition passes.	• The reset switch is disconnected or misconnected. • The reset switch is malfunctioning.	1. Verify that the wiring to the **RESET** (2) terminals of the controller terminal strip is correct and secure. 2. If the reset switch difficulties continue, contact RKI for further instruction.

Parts List

This appendix lists the part numbers and descriptions for replacement parts and accessories offered for the Beacon 200 Gas Monitor.

Table 12: Parts List, Beacon 200 Gas Monitor

Part No.	Description
18-0107RK	Conduit Hub (3/4 in.)
43-0440RK	Reset Switch
43-4165RK	AC Fuse, 1/4” x 1 1/4”, fast acting, 3A, 250 V
43-4170RK	DC Fuse, 1/4” x 1 1/4”, fast acting, 6A
52-1016RK	Buzzer
71-0059RK	Beacon 200 Gas Monitor Operator’s Manual (this document)