



INSTRUMENTS

30-0954-265-01
Sample Draw Aspirator Adapter
Operator's Manual

Part Number: 71-0464

Revision: 0

Released: 5/29/20

Product Warranty

RKI Instruments, Inc., warrants gas alarm equipment sold by us to be free from defects in materials, workmanship, and performance for a period of one year from date of shipment from RKI Instruments, Inc. Any parts found defective within that period will be repaired or replaced, at our option, free of charge. This warranty does not apply to those items which by their nature are subject to deterioration or consumption in normal service, and which must be cleaned, repaired, or replaced on a routine basis. Examples of such items are:

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

Warranty is voided by abuse including mechanical damage, alteration, rough handling, or repair procedures not in accordance with the operator's manual. This warranty indicates the full extent of our liability, and we are not responsible for removal or replacement costs, local repair costs, transportation costs, or contingent expenses incurred without our prior approval.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF RKI INSTRUMENTS, INC., INCLUDING BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL RKI INSTRUMENTS, INC., BE LIABLE FOR INDIRECT, INCIDENTAL, OR CONSEQUENTIAL LOSS OR DAMAGE OF ANY KIND CONNECTED WITH THE USE OF ITS PRODUCTS OR FAILURE OF ITS PRODUCTS TO FUNCTION OR OPERATE PROPERLY.

This warranty covers instruments and parts sold to users by authorized distributors, dealers, and representatives as appointed by RKI Instruments, Inc.

We do not assume indemnification for any accident or damage caused by the operation of this gas monitor, and our warranty is limited to the replacement of parts or our complete goods.

Table of Contents

Chapter 1: Introduction	5
Overview	5
About the 30-0954-265-01	5
About this Manual	5
Specifications	6
Chapter 2: Description	8
Overview	8
Beacon 110	9
Aspirator Adapter	15
Chapter 3: Installation & Startup	19
Overview	19
Mounting the 30-0954-265-01	19
Making Tubing Connections	20
Wiring the 30-0954-265-01	21
Start Up	28
Chapter 4: Operation	29
Overview	29
Normal Operation	29
4 - 20 mA Signal Output Operation	29
Viewing and Resetting Min/Max Readings	30
Battery Charging (Optional)	30
Beacon 110 Alarm Indications	31
Chapter 5: Configuration Mode	35
Overview	35
Viewing & Changing Beacon 110 Parameters	35

Chapter 6: Input Mode	38
Overview	38
Selecting the Detector Head Input and Gas Type	38
Chapter 7: Maintenance	42
Overview.....	42
Calibration Frequency.....	42
Calibration Mode	42
Replacing the Infrared Methane Detector.....	46
Blowback Operation.....	47
Setting the Drain Fault Switch	47
Replacing the Water Trap’s Filter Element.....	48
Replacing the Fuses	49
Preventive Maintenance	49
Trouble Shooting.....	50
Parts List	52
Appendix A: Control Button Quick Reference Guide.....	53

Chapter 1: Introduction

Overview

This chapter briefly describes the 30-0954-265-01. This chapter also describes the *30-0954-265-01 Operator's Manual* (this document). Table 1 at the end of this chapter lists the specifications for the 30-0954-265-01.

About the 30-0954-265-01

The 30-0954-265-01 is intended to detect methane and consists of a Beacon 110 and an aspirator adapter with an infrared methane detector head. The Beacon 110 is mounted to the aspirator adapter. All user adjustable parameters may be accessed using push button switches at the Beacon 110.

The Beacon 110 displays the current gas reading on an LCD display which is visible through a window in the door. It 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 infrared methane detector head, aspirator adapter, or Beacon 110. The Beacon 110 provides a 4 - 20 mA signal proportional to the target gas reading for use by a recording device. Three sets of relay contacts, two controlled by the gas alarms and one by the fail alarm, rated at 10 amps 115 VAC, 10 amps 220 VAC, and 10 amps 30 VDC are available for controlling devices such as lights or horns or for controlling higher rated relays.

Three operating modes in the Beacon 110 allow you to display and change setup and calibration settings and change the detector head input type. They are Calibration Mode, Configuration Mode, and Input Mode.

About this Manual

The *30-0954-265-01 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.

Specifications

Table 1 lists specifications for the 30-0954-265-01.

Table 1: 30-0954-265-01 Specifications

Target Gas	Methane (CH ₄)
Detection Range	0 - 100% LEL
Response Time	90% in 45 seconds
Accuracy	±5% of reading or ±2% of full scale (whichever is greater)
Input Power	100/115/220V ~ ±10%, 50/60Hz, 0.2/0.2/0.1A or 24 V $\overline{\text{---}}$ ± 10%, 0.5A VDC
Construction (housing)	Fiberglass/polyester with lexan window (NEMA 4X)
Dimensions	8.5 in. H x 6.5 in. W x 4.5 in. D (216 mm H x 165 mm W x 108 mm D)
Weight	4.2 lbs.
Safety/Regulatory (Beacon 110 only)	 C US 186718
Environmental Conditions	<ul style="list-style-type: none"> • For indoor or outdoor locations (Type 4X) • -20°C to 50°C (-4°F to 122°F) ambient • Maximum relative humidity of 80% • Main supply voltage fluctuations not exceeding ± 10% of nominal • DC supply voltage fluctuations not exceeding ±10% of nominal • Overvoltage Category II, Pollution Degree 2
Relays	<ul style="list-style-type: none"> • Relay contacts rated for 10A @ 115/220V~ resistive or 10A @ 30V$\overline{\text{---}}$ resistive • SPDT Form C
User Controls	<ul style="list-style-type: none"> • Three push button control switches • One ON/OFF toggle switch • One push button reset switch
Signal Output	<ul style="list-style-type: none"> • 4 to 20 mA, 500 ohms impedance max
Maximum Compressed Air Supply Pressure	140 PSI
Outlet Pressure to Aspirator	5 - 50 PSI adjustable (determined by required flow rate)
Recommended Total Flow Rate	3 SCFH (standard cubic feet per hour)
Low Flow Setpoint	1.6 SCFH (standard cubic feet per hour)

WARNING: *When using the 30-0954-265-01, you must follow the instructions and warnings in this manual to assure proper and safe operation of the 30-0954-265-01 and to minimize the risk of personal injury. Be sure to maintain and calibrate the 30-0954-265-01 as described in this manual.*

Chapter 2: Description

Overview

This chapter describes external and internal components of the 30-0954-265-01 gas monitor.

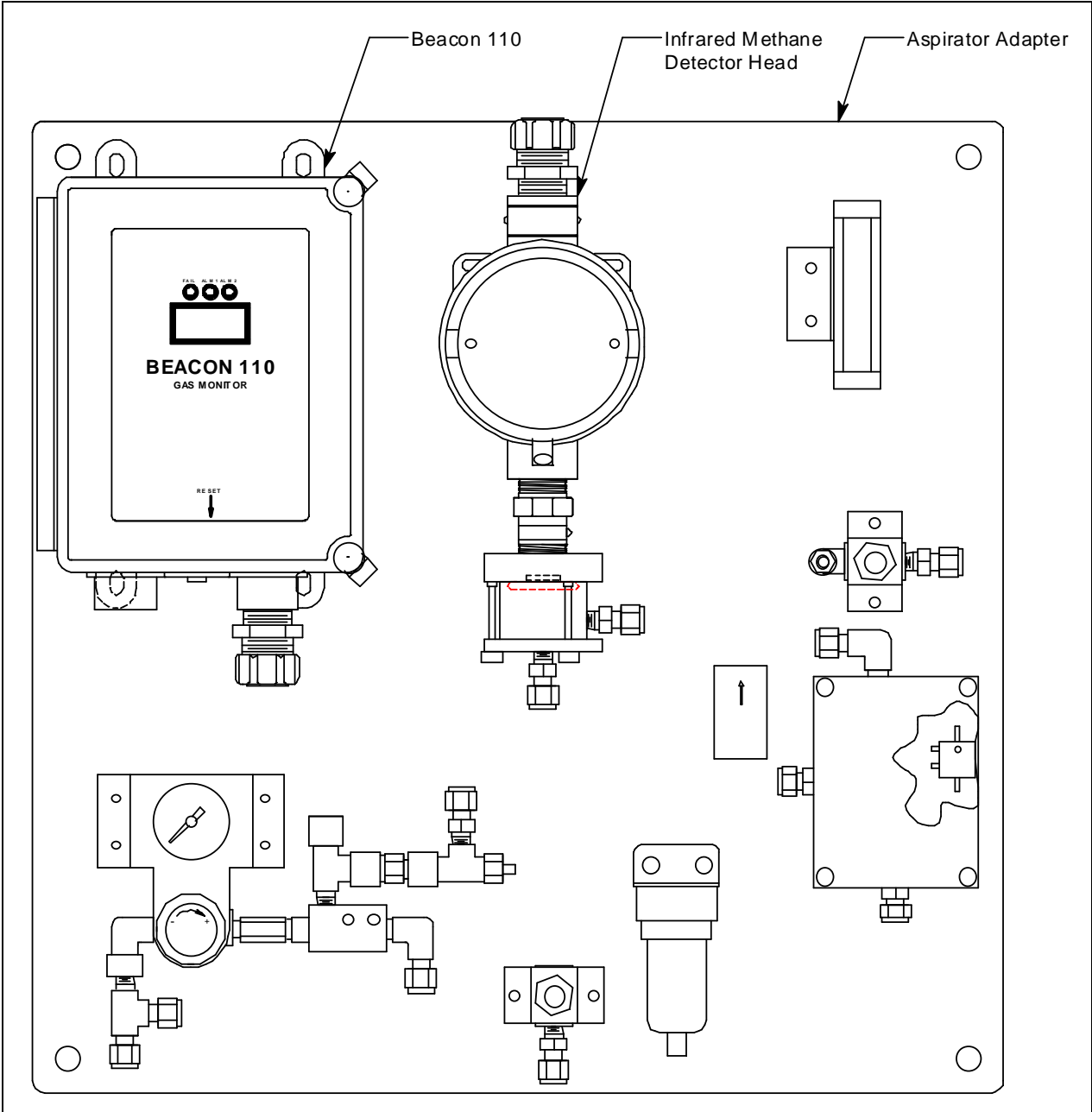


Figure 1: 30-0954-265-01 Components

Beacon 110

External Description

This section describes the housing and all external components of the Beacon 110. For the purposes of this description, the housing door is considered the front of the monitor.

Housing

The Beacon 110'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 a window in the housing door. Four mounting feet are attached to the back of the housing (one at each corner). The mounting feet allow installation to a vertical surface. Two conduit hubs on the bottom of the housing are for external wiring connections. The infrared methane detector head is factory wired through the right hub.

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

Buzzer

The buzzer is on the bottom center of the housing in front of the reset switch. The buzzer sounds audible alarms to warn you of gas alarms and instrument failures.

Reset Switch

The reset switch is on the bottom of the housing behind the buzzer. The reset switch serves three functions:

- You can reset the alarm circuits for “latched” alarms after an alarm 1 or alarm 2 condition passes.
- You can silence the buzzer during an alarm 1 or an alarm 2 condition. You cannot silence a fail condition.
- You can display and reset the minimum and maximum readings that the Beacon 110 has experienced since the last min/max reset or startup.

Internal Description

This section describes the internal components of the Beacon 110.

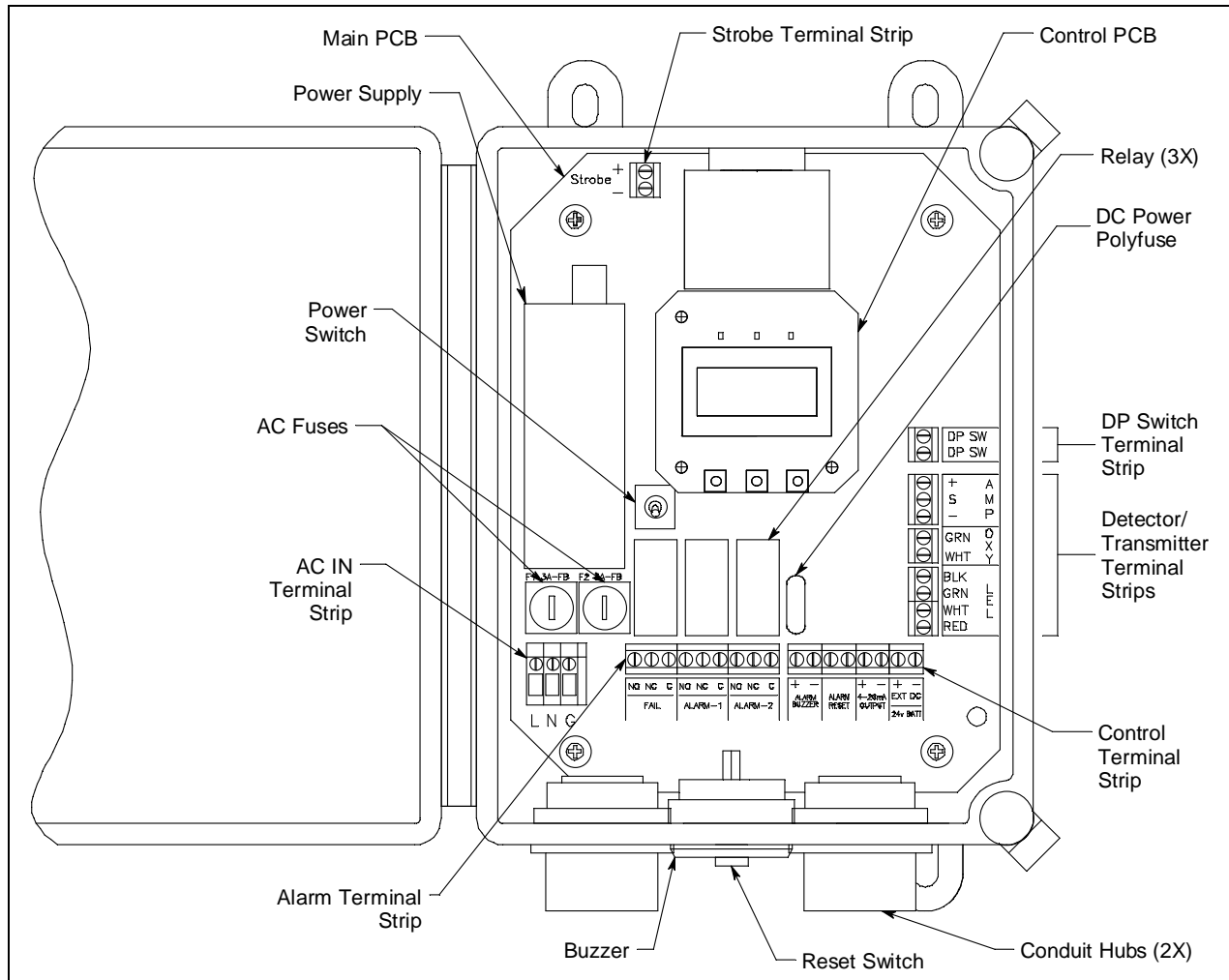


Figure 2: Beacon 110 Component Location

Main Printed Circuit Board (PCB)

The main PCB is mounted inside the housing. The main PCB includes the power supply, terminal strips, relays, fuses, and power switch.

Power Supply

The power supply is located on the left side of the main PCB. It takes AC line voltage supplied to the Beacon 110 and converts it to 24 VDC which is used to run the Beacon 110.

Terminal Strips

The Beacon 110 includes terminal strips for external and factory wiring connections. See “Wiring the 30-0954-265-01” on page 21 for detailed wiring procedures.

- **AC In Terminal Strip.** The AC in terminal strip is a 3-point terminal strip located in the lower left corner of the main PCB. It facilitates wiring from the AC power source. Table 2 lists the function of each terminal.

Table 2: Terminal Assignments for the AC In Terminal Strip

Terminal	Connects to:
L	Hot (line) wire from AC power source.
N	Neutral wire from AC power source.
G	Earth ground

- **Alarm Terminal Strip.** The 9-point alarm terminal strip is located along the bottom edge of the main circuit board to the right of the AC In Terminal Strip (see Figure 2). It facilitates wiring external alarm devices (horn, strobe, etc.) to the alarm relay contacts and includes common (C), normally closed (NC) and normally open (NO) terminals for fail, alarm 1, and alarm 2.
- **Controller Terminal Strip.** The 8-point controller terminal strip is located along the bottom edge of the main circuit board to the right of the alarm terminal strip (see Figure 2). 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:
Alarm Buzzer + & -	Factory installed buzzer (factory-wired)
Alarm Reset (2)	Reset switch (factory-wired)
4 - 20 mA Output +	+ connection of 4 - 20 mA output
4 - 20 mA Output -	- connection of 4 - 20 mA output
EXT DC (24V BATT) +	+ connection from 24 VDC power source ¹ (or 24 V backup battery)
EXT DC (24V BATT) -	- connection from 24 VDC power source ¹ (or 24 V backup battery)
<i>¹ If DC power is used as the primary power source, do not make wiring connections to the AC terminal strip.</i>	

- **Detector/Transmitter Terminal Strips.** Three adjacent terminal strips are located along the right side of the main circuit board above the controller terminal strip (see Figure 2). These three terminal strips facilitate wiring connections to a detector or a 4 - 20 mA transmitter. The lower 4-point terminal strip is labelled **LEL** and is used to wire a combustible detector. The middle 2-point terminal strip is labelled **Oxy** and is used to wire an oxygen detector. The top 3-point terminal strip is labelled **AMP** and is used to wire 4 - 20 mA transmitters or direct connect preamp type detectors. Only one detector head at a time may be wired to the Beacon 110. The infrared methane detector head is factory wired to the **LEL** terminal strip.

Ground Stud

The threaded ground stud is used for making connections to earth ground. It is connected through the main PCB to the **G** (ground) terminal on the AC in terminal strip. A kep nut on the stud may be removed for installation of one or more lugs to make wiring connections. This stud is typically used to connect the shield drain wire of shielded cable to earth ground at the Beacon 110.

Relays

The Beacon 110 includes three alarm relays located above the alarm terminal strip. They are from left to right Fail, Alarm 1, and Alarm 2. The relays are form C, single-pole, double-throw (SPDT) and rated for 10 amps at 250 VAC (resistive).

NOTE: You can select normally energized (N.EN) or normally de-energized (N.DE-EN) settings for the alarm 1 and alarm 2 relays. See “Chapter 5: Configuration Mode” on page 35.

The fail relay is factory set as normally energized and is not user adjustable.

AC & DC Circuit Protection

Two AC fuses are used in the Beacon 110. The two fuses are located on the left side of the main PCB, above the AC power terminal strip and below the power supply. 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 110. They are housed in vertical fuse holders and are held in the holder by a quarter turn cover. They are labelled as F1 (left fuse) and F2 (right fuse) on the PCB silk-screen and are rated at 3 A, 250 V.

A polyswitch is used to protect the DC power input. It is located to the right of the relays and is labelled on the PCB silkscreen as PS3. In the event of a short circuit or other electrical fault which causes a high current draw in the Beacon 110, the polyswitch will interrupt the DC power if the unit is powered from DC. When the fault situation is corrected, the polyswitch resets and the unit will continue to operate. The polyswitch is not user serviceable.

Power Switch

The power switch is located to the right of the power supply and above the relays (see Figure 2). The power switch turns the incoming AC power source on and off at the Beacon 110. When the switch is up, the power switch is on.

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

Control PCB

The LCD display and control buttons are located on the control PCB. It is installed on the main PCB with three standoffs. The control PCB is connected to the main PCB with the display cable which is a ribbon cable terminated with 20 position rectangular connectors on each end. The display cable connects to the control PCB on the back of the top edge and to the main PCB directly below the control PCB.

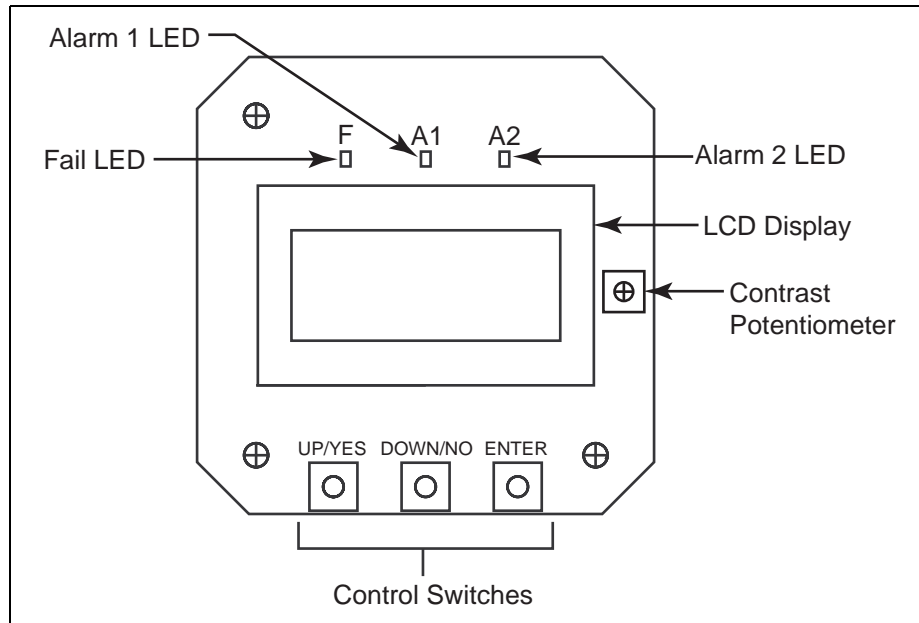


Figure 3: Control PCB Component Location

LCD Display

The LCD display is located at the top of the control PCB. It indicates the current gas reading and displays messages and parameters in the Beacon 110's operating modes.

Contrast Potentiometer

The contrast potentiometer is located to the right of the LCD display. It is used to adjust the contrast of the LCD. If the background of the LCD appears so dark that the characters are not visible or if the characters are too dim, turn the adjustment screw on the potentiometer clockwise or counterclockwise until the desired visibility is obtained.

Control Buttons

The Beacon 110 includes three push button switches that allow you to enter the Beacon 110's operating modes, navigate through the modes, update settings, and save changes to the settings. The push button switches are located along the bottom edge of the control PCB (see Figure 3). The UP/YES button is on the left, the DOWN/NO button is in the middle, and the ENTER button is on the right.

Table 4: Beacon 110 Control Button Functions

Switch	Function
UP/YES	<ul style="list-style-type: none">• Saves settings• Changes the displayed setting• Enters Calibration Mode• Enters Input Mode (press with DOWN/NO button)• Enters Configuration Mode (press with ENTER button)
DOWN/NO	<ul style="list-style-type: none">• Cancels setting changes• Changes the displayed setting• Enters Input Mode (press with UP/YES button)• Displays the Information Screen
ENTER	<ul style="list-style-type: none">• Initiates operations• Enters Configuration Mode (press with UP/YES button)• Accepts displayed parameters

Status LEDs

The Beacon 110 includes three active status LEDs that are located above the display (see Figure 2). Two LEDs, labelled RX and TX, to the right of those described below, are not active.

- Fail LED

The fail LED turns on when the Beacon 110 is experiencing a fail condition. A fail condition can be caused by a detector failure or low detector signal.

- Alarm 1 LED

The alarm 1 LED is on when the Beacon 110 is experiencing an alarm 1 condition.

- Alarm 2 LED

The alarm 2 LED is on when the Beacon 110 is experiencing an alarm 2 condition.

Aspirator Adapter

External Description

The sample draw aspirator adapter uses compressed air flowing through a venturi to draw air into a sample chamber.

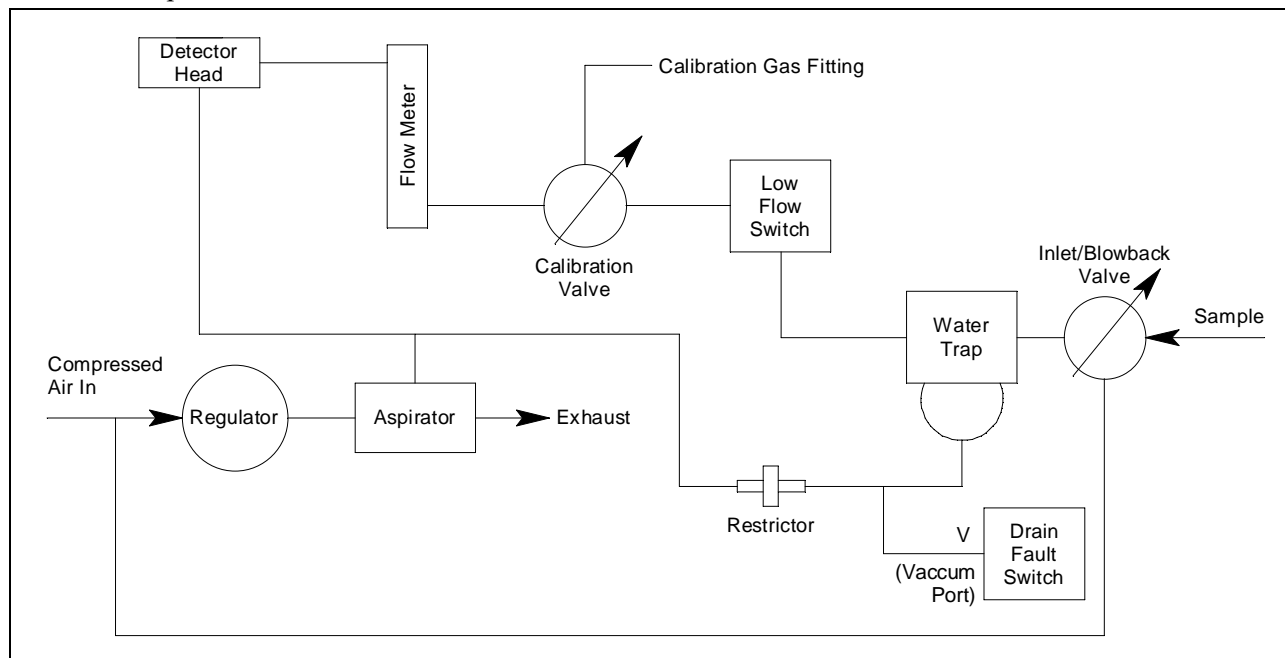


Figure 4: Flow Diagram

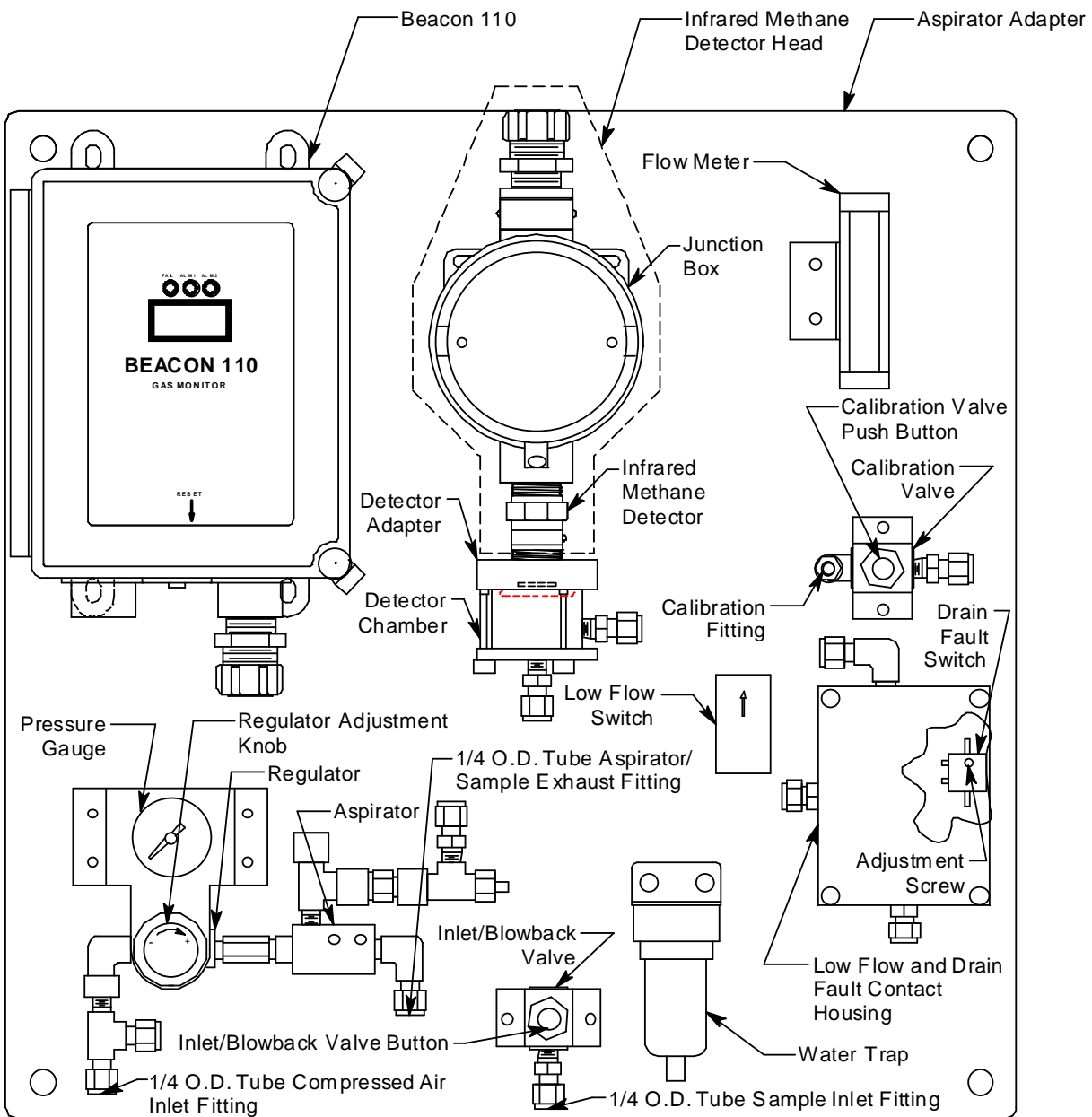


Figure 5: Component Location

The sample draw adapter consists of ten major components (see Figure 5): the infrared methane detector head, regulator, aspirator, detector adapter, detector chamber, flowmeter, calibration valve, inlet/blowback valve, water trap, and low flow/drain fault contact housing.

Infrared Methane Detector Head

The infrared methane detector head provides a signal that can be used by the Beacon 110 to indicate the sample gas level. Figure 5 above shows the location of the infrared methane detector head. The detector head consists of the infrared methane detector and a junction box, described below.

Infrared Methane Detector

The infrared methane detector is made up of a miniature infrared combustible gas LEL detector housed and encapsulated in a pipe nipple. The pipe nipple has 3/4 inch NPT threads on each end and a 1-1/4 inch hex that allows removal or installation of the detector with a wrench. A porous flame arrestor coated with a hydrophobic film that repels liquids is on one end of the detector and allows sample gas to enter the detector. Four color coded leads, red, white, green, and black, extend from the other end of the detector. The leads allow you to connect the detector to the terminal block in the junction box.

Junction Box

The stainless steel, corrosion resistant junction box protects the detector wiring connections. Two conduit hubs allow for detector installation and wiring. A cover on the front of the junction box allows access to the interior of the junction box. A locking set screw on the junction box cover allows you to secure the junction box cover and prevent it from being removed. An O-ring seals the interface between the junction box cover and the junction box base.

The infrared methane detector is factory installed in the bottom conduit hub. A cable bushing is factory installed in the top conduit hub.

Regulator

The regulator has an inlet port on its left side with a 1/4" tube fitting. The maximum allowable inlet pressure is 140 PSI. A gauge at the bottom of the regulator indicates the output pressure. The output pressure, and detector flow, can be adjusted using the knob on the front of the regulator. The detector flow rises or falls as the output pressure is increased or decreased.

Aspirator

The aspirator inlet is connected to the output port on the right side of the regulator and the vacuum port on top is connected to the detector chamber. It has a venturi tube inside it which generates a vacuum at its top port when compressed air flows through it. The compressed air and the air drawn from the detector chamber into the top port of the aspirator both exhaust at the right side of the aspirator.

Detector Adapter

The detector adapter screws directly onto the infrared methane detector. It is installed hand tight. It has an O-ring inside it which seals against the detector. When removing this adapter to change the infrared methane detector, be sure not to lose this O-ring.

Detector Chamber

The chamber has three thumbscrews which fasten it to the detector adapter. An O-ring at the top of the chamber seals the chamber/adapter interface. The inlet of the chamber is on the side and is connected to the exhaust of the flowmeter. The exhaust of the chamber is at the bottom and is connected to the vacuum port of the aspirator.

Flowmeter

The flowmeter indicates the flow to the infrared methane detector. It has a 1/4" OD tube fitting at its inlet and exhaust port. The exhaust port of the flow meter is connected to the detector chamber. The flowmeter's indication range is 1 - 10 SCFH. It has no flow adjustment valve because the flowrate is controlled by the regulator setting.

Calibration Valve

The calibration valve is a manual operation spring return valve with a push button actuator. This valve is used to switch from sample flow to calibration gas during the calibration process. When the button is pushed and held, the sample port is closed and the calibration port is opened.

Inlet/Blowback Valve

The inlet/blowback valve is a manual operation spring return valve. A push button actuator is located on the front of the valve. This valve is used to switch from sample flow to blow back in the event of a clogged sample line. When the push button is pressed and held, the valve diverts the compressed air supply back through the sample line to clear obstructions.

WARNING: *The blowback pressure can be as high as 140 psi. Make sure that all personnel and equipment are clear of the sample line inlet end to avoid personal injury or equipment damage if a sample line obstruction is blown out of the sample line.*

Water Trap

The water trap prevents water from entering the flow system and is self-draining.

Low Flow/Drain Fault Contact Housing

The low flow switch provides open contacts in normal operation in the low flow/drain fault contact housing that close in the event of a low flow condition. Two contact wires protrude from the side of the switch and enter the low flow contact housing through a plastic cable bushing on the left side of the housing. Terminals are provided in the low flow/drain fault contact housing for field connection to the switch contacts.

The drain fault switch senses a break or very low flow in the water drain line and provides open contacts in normal operation in the low flow/drain fault contact housing which close when the switch senses a break, a very low drain flow, or a shut down.

Connecting monitoring devices to the low flow and drain fault contact terminals provides the user with a notification of a contact closure. Each set of contacts may have their own monitoring device or they may share one. See "Low Flow/Drain Fault Wiring" on page 26 for instructions to wire these terminals using the two scenarios.

A second plastic cable bushing on the bottom of the low flow/drain fault contact housing allows for cable entry to the housing. The size range of the cable which can be routed through the second cable bushing is .064" - .210" OD.

Chapter 3: Installation & Startup

Overview

This chapter describes procedures to mount the 30-0954-265-01, make tubing connections, make wiring connections, and start up the monitor.

WARNING: Perform all installation and start-up procedures in a “fresh air” environment (environment known to be free of combustible gas, toxic gas, and of normal oxygen content). The 30-0954-265-01 is not in operation as a gas monitoring system until the start-up procedure is complete.

Mounting the 30-0954-265-01

Perform the following procedure to install the sample draw aspirator adapter at the mounting site.

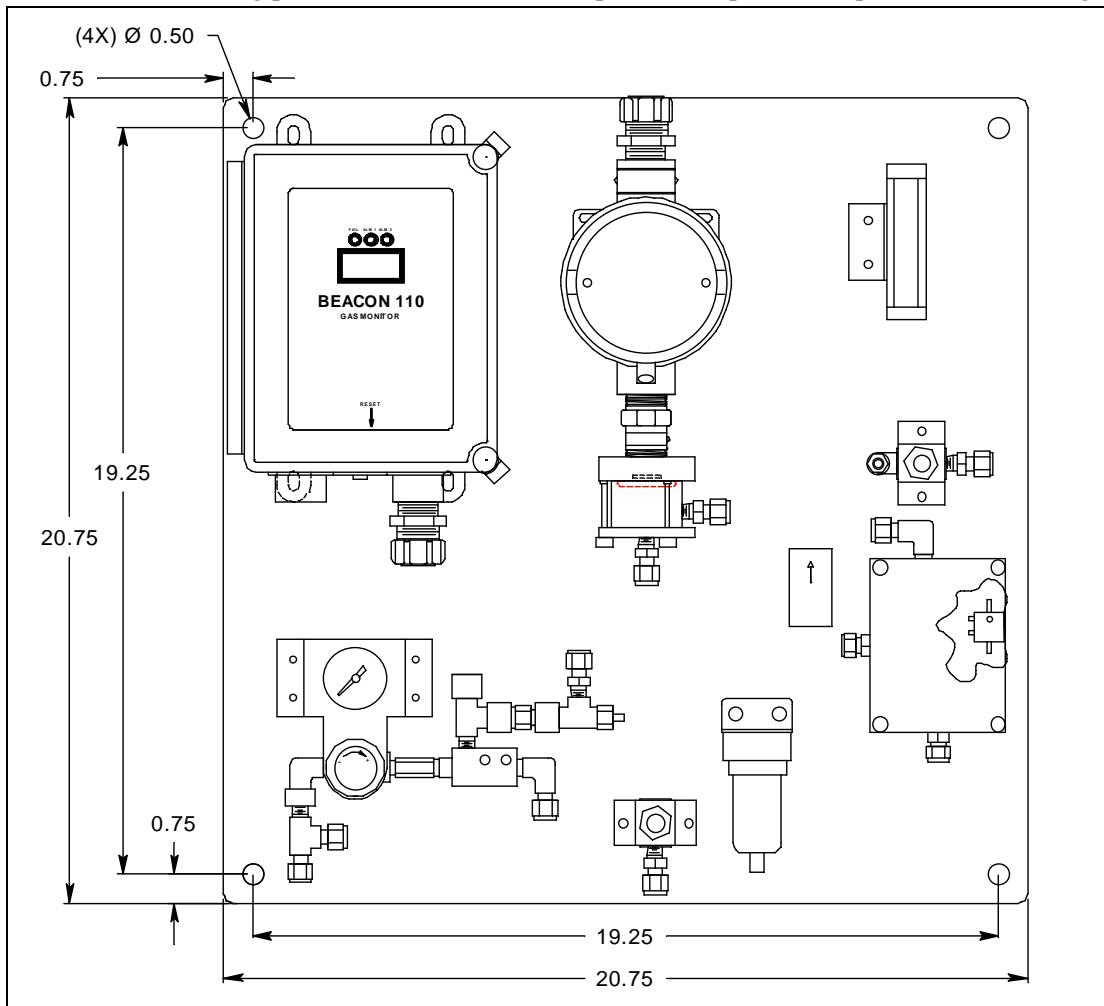


Figure 6: 30-0954-265-01 Outline & Mounting Dimensions

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 Beacon 110 housing door and make wiring connections through the conduit hubs at the bottom of the housing?
 - Are the Beacon 110's display screen and status lights visible?
 - Is there sufficient clearance for routing the sample, compressed air, and exhaust lines?
2. If necessary, close and latch the housing door.
3. Position the 30-0954-265-01 on a vertical surface at eye level (4 1/2 to 5 feet from the floor).
4. Install the 30-0954-265-01 to a flat vertical surface using the four mounting holes (0.50" diameter) in the corners of the panel.

Making Tubing Connections

1. Connect a sample line from the area to be sampled to the sample inlet fitting at the bottom right of the aspirator panel. The fitting accepts 1/4" OD rigid metal tubing such as copper, aluminum, or stainless steel tubing. Be sure to use tubing appropriate for the target gas.
2. The aspirator exhaust includes the sample air. It may be routed to a different area where it can be exhausted safely by running tubing from the aspirator exhaust fitting to the "safe" area. The aspirator exhaust fitting is a 1/4" OD tubing fitting.
3. Turn the regulator adjustment knob completely counterclockwise and then turn it one turn clockwise so that the flow will start out at a low level when the compressed air is connected and turned on.
4. Connect a compressed air source up to a maximum of 140 PSI to the inlet of the regulator. Although the regulator is rated up to 300 PSI inlet pressure, other components are rated to a maximum of 140 PSI.

NOTE: Connect the compressed air but leave it turned off until instructed to set the flow rate in "Start Up" on page 28.

Wiring the 30-0954-265-01

This section describes procedures to connect the AC power source, DC power source, external alarm(s), and the low flow/drain fault contacts. It also describes the factory wiring of the infrared methane detector.

WARNING: *Make all connections to the 30-0954-265-01 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 to the Beacon 110

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. All connections to building electrical systems must be installed in accordance with local requirements and must be installed by qualified personnel. If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Install an appropriate switch or circuit breaker in the AC line close to the 30-0954-265-01 that meets the local electrical code and within easy reach of the operator. The switch or circuit breaker must be marked as the disconnecting device for the Beacon 110.

Perform the following procedure to connect the AC power source to the Beacon 110.

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

1. Turn off or unplug all incoming power to the Beacon 110.
2. Open the housing door, then place the power switch in the OFF position.

CAUTION: *The power switch does not control DC input power.*

3. Install an appropriately rated cable bushing or conduit to the left conduit hub on the bottom of the Beacon 110 housing.
4. Locate the 3-point AC in terminal strip in the lower left corner of the main PCB (see Figure 2 on page 10). The terminals are labelled **L**, **N**, and **G**.
5. Guide the AC power cord or wires through the left conduit hub on the bottom of the Beacon 110 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 7 below.

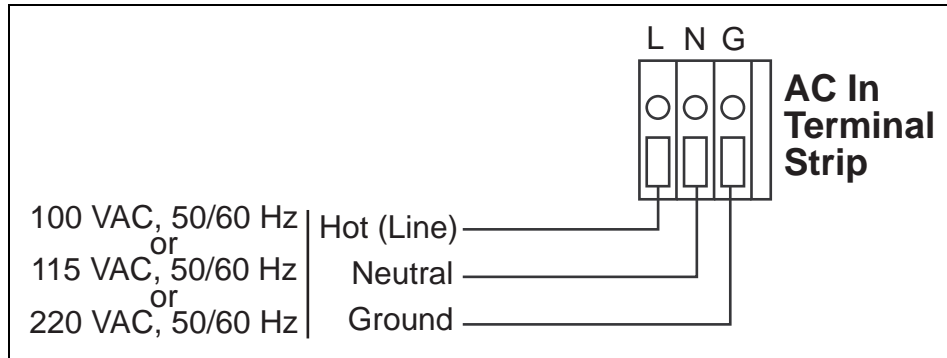


Figure 7: AC Power Wiring

Connecting the DC Power Source to the Beacon 110

WARNING: *Verify that the power source is unplugged or turned off 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. You may use a self contained 24 VDC backup that keeps its batteries charged while AC power is on and recharges the batteries when AC power returns after a power failure. If DC power is the **primary** power source, **DO NOT** connect AC power.

1. Turn off or unplug all incoming power to the Beacon 110.
2. Open the housing door, then place the power switch in the OFF position.

CAUTION: *The power switch does not control DC input power.*

3. Locate the DC power terminals on the controller terminal strip in the lower right corner of the main PCB (see Figure 2 on page 10). They are labeled EXT DC + and EXT DC -.
4. Install an appropriately rated cable bushing or conduit to the left conduit hub on the bottom of the Beacon 110 housing.
5. Guide a DC power cord or wires through the 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.*

6. Connect the DC wires to the controller terminal strip as shown in Figure 8.

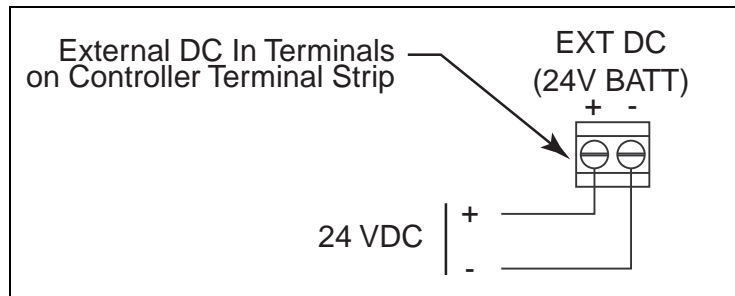


Figure 8: DC Power Wiring

NOTE: The Beacon 110 will operate from the DC input down to 18.5 volts. If a self contained backup battery is used, see its operator's manual for a description of its recharging characteristics.

Connecting External Alarms to the Beacon 110

Perform the following procedure to connect external alarms to the Beacon 110.

1. Turn off or unplug all incoming power to the Beacon 110.
2. Open the housing door, then place the power switch in the OFF position.

CAUTION: *The power switch does not control DC input power.*

3. Locate the alarm terminal strip. See Figure 2 on page 10 to assist you in locating the alarm terminal strip.
4. Install an appropriately rated cable bushing or conduit in the left conduit hub on the bottom of the Beacon 110 housing.
5. Guide the wiring of the external alarm through the left conduit hub on the bottom of the Beacon 110 housing.

CAUTION: *Do not route the external alarm wiring and detector wiring through the same conduit hub. The external alarm wiring may disrupt the transmission of the detector signal to the Beacon 110.*

6. Connect the leads from the external alarm to the appropriate terminals on the alarm terminal strip as shown in Figure 9 to obtain the desired operation.

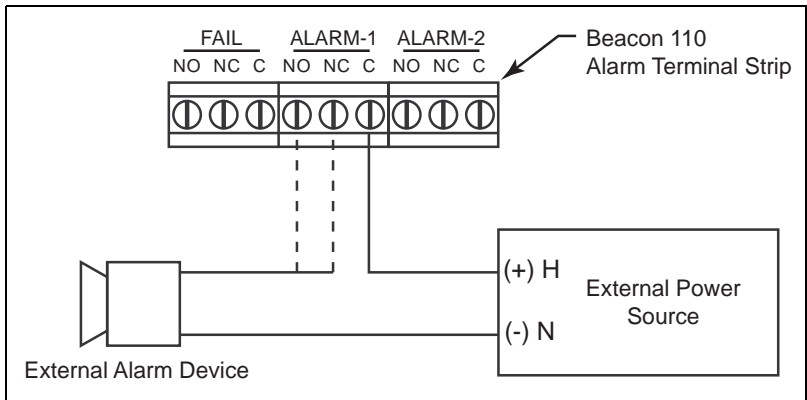


Figure 9: Typical Alarm Device Wiring

7. Repeat steps 5 and 6 for additional alarm devices.

Infrared Methane Detector Head Wiring

The infrared methane detector is factory wired to the terminal strip in the junction box. The terminal strip is factory wired to the Beacon 110 using shielded cable. Wiring connections are shown below for reference.

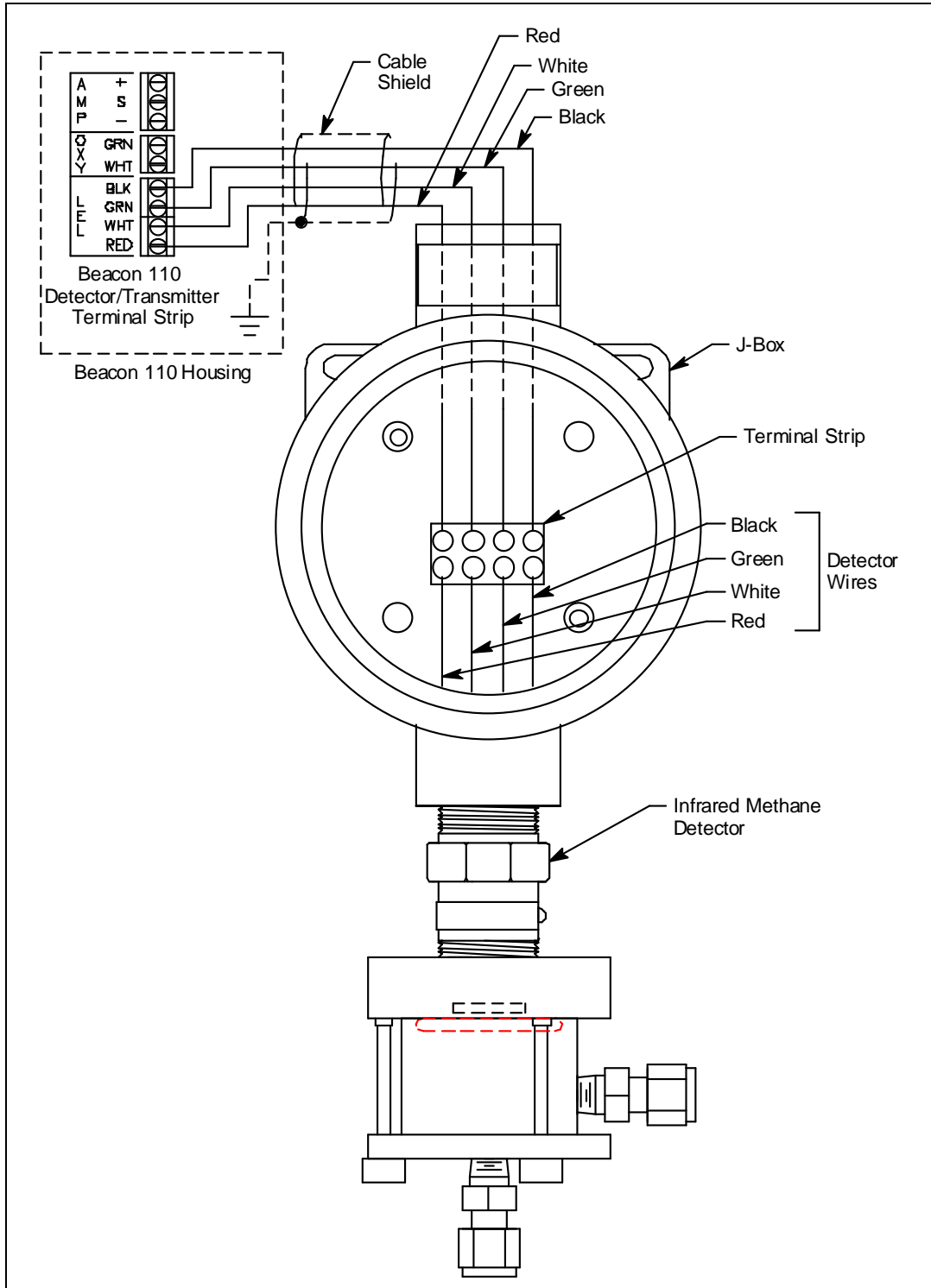


Figure 10: Infrared Methane Detector Head Wiring

Low Flow/Drain Fault Wiring

Connect a contact monitoring device to the low flow and drain fault contact terminals inside the low flow and drain fault contact housing using the field wiring cable entry bushing. The contact terminals are open during normal operation.

The contacts may be wired individually or in parallel.

When wired individually, you will need one monitoring device for each set of contacts. When a specific monitoring device goes into alarm, you will immediately know which set of contacts closed and what the problem is.

When wired in parallel, only one monitoring device is needed to monitor both sets of contacts. However, when that device goes into alarm, it will be unclear which set of contacts closed without further investigation.

Wiring diagrams for each scenario are shown below.

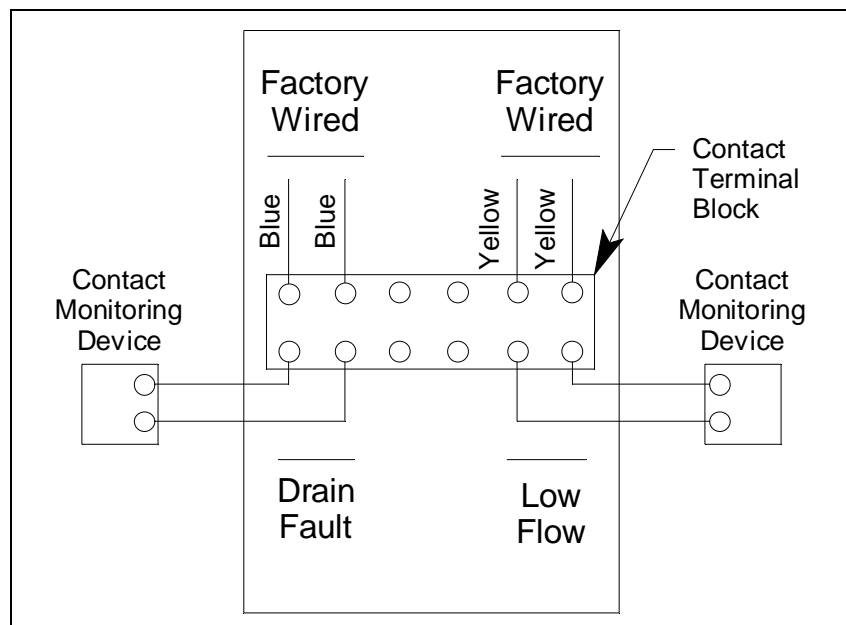


Figure 11: Low Flow and Drain Fault Wiring, Independent Wiring

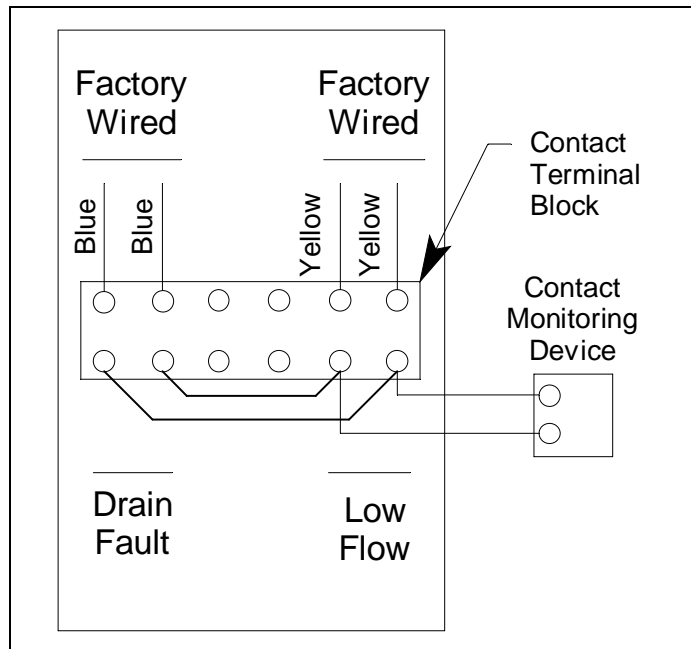


Figure 12: Low Flow and Drain Fault Wiring, Parallel Wiring

Start Up

Introducing Incoming Power

Perform the following procedure to place the 30-0954-265-01 into normal operation.

1. Complete the mounting and wiring procedures described earlier in this chapter.
2. Verify that all wiring connections are correct and secure and that the Beacon 110's power switch is in the OFF position.
3. Plug in or turn on the incoming power source (AC or DC).
4. Turn on the power switch if AC power is used as primary power.
5. The LCD display will indicate the firmware version when the Beacon 110 is first powered up and will then count down a one minute warm-up period before normal operation begins. During normal operation, the display will indicate the current gas reading and target gas. Verify that the display is indicating the current gas reading and target gas after the warm-up period is complete and normal operation begins, for example:

METHANE 0 %LEL

NOTE: To prevent unwanted alarms during warm up, the alarm circuits are not active during the warm-up period.

6. Turn on the compressed air source and adjust the regulator adjustment knob so that the flowmeter indicates 3.0 SCFH. The regulator exhaust pressure indicated by the regulator gauge will vary for a particular flow depending on the length of the sample line and other restrictions such as filters. Typically the pressure will be between 5 and 10 PSI for short sample runs. It will be higher for longer sample runs and if filters are used.
7. If the Beacon 110 is reading 0 %LEL, startup is complete. If it is not, perform a zero adjustment as described in "Performing a Zero Adjustment" on page 44.

Chapter 4: Operation

Overview

This chapter describes the 30-0954-265-01 in normal operation, the Beacon 110's 4-20 mA signal output, how to view and reset the min/max readings, and the 30-0954-265-01 in alarm.

Normal Operation

Normal operation is defined as follows:

- The start-up procedure is complete.
- The aspirator adapter's flowmeter is indicating 3.0 SCFH.
- The Beacon 110 is not indicating an alarm 1, alarm 2, fail, or low flow condition.
- The Beacon 110 is not in Calibration, Configuration, or Input Mode.

During normal operation, the Beacon 110 simultaneously displays the current gas reading, unit of measure, and target gas.

METHANE 0 %LEL

The low flow contacts are open during normal operation (flow above 1.6 SCFH). If the low flow switch senses a low flow condition in the sample flow (flow below 1.6 SCFH), it will close the low flow contacts located in the low flow/drain fault contact housing. The aspirator adapter will continue to draw sample even during a low flow condition.

The drain fault contacts are open during normal operation. If the drain fault switch senses a break or a very low flow in the drain line (likely caused by an object in the drain line), the drain fault contacts located in the low flow/drain fault contact housing will close. The aspirator adapter will continue to operate even during a drain fault condition.

4 - 20 mA Signal Output Operation

The output at the 4 - 20 mA output terminals is a 4 - 20 mA signal that is proportional to the detection range of the infrared methane detector. During normal operation, this signal tracks the gas concentration on the LCD.

There are several circumstances where the signal output will not track the display reading but will behave as follows:

- When the Beacon 110 is in its warm-up period, the signal output will be fixed at 4 mA (zero).
- When the Beacon 110's gas type is changed, the Beacon 110 will enter Configuration Mode for you to verify the parameter settings. When you exit Configuration Mode, the display will indicate **NEEDS CALIBRATION** and will continue to indicate this until Calibration Mode is entered and a calibration is performed. In this situation, the signal output will be fixed at 3.5 mA from the time Gas Type Mode is entered until the Beacon 110 is calibrated and returns to normal operation.

- If you enter Calibration Mode, Configuration Mode, or Gas Type Mode, the signal output will be fixed at 3.5 mA until the Beacon 110 returns to normal operation.
- If the Beacon 110's input power decreases below 18.5 volts so that the Beacon 110 is in a low power alarm, the signal output is fixed below 2.4 mA until the low power alarm is cleared.
- If the Beacon 110 goes into a fail condition, after a 30 second delay, the signal output is fixed below 2.4 mA until the fail alarm is cleared. During the 30 second delay, the output follows the detector output. In the case of a downscale reading, the displayed gas reading will only go as low as -10% of full scale but the signal output will continue to track the reading even if it's lower than -10% of full scale.

Viewing and Resetting Min/Max Readings

The reset switch may be used to view and reset the minimum and maximum gas readings.

NOTE: Minimum and maximum readings are reset if the instrument is turned off.

1. While the 30-0954-265-01 is in normal operation, press and hold the Beacon 110's reset switch button for 5 seconds.
2. The display will indicate the minimum reading on the bottom display line and the maximum reading on the top display line for about 3 seconds before indicating **<RESET> TO CLEAR**.
3. 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. It will return to normal operation in about 5 seconds.

To reset the minimum and maximum readings, press and hold the reset switch button while the **<RESET> TO CLEAR** message is on the display until the display indicates **Min/MAX Is RESET**. Release the reset switch button. The unit will then return to normal operation in about 5 seconds.

Battery Charging (Optional)

Battery charging is not included in the 30-0954-265-01.

Beacon 110 Alarm Indications

NOTE: The Beacon 110 includes alarm on and alarm off delay settings for alarm 1 and alarm 2. The alarm indications described in this section operate according to the factory set alarm settings. See Table 6 on page 36 for all the factory settings.

Table 5: Alarm Indications

Condition	Cause	Visual Indications	Audible Indications	Other Indications
Alarm 1 ¹	Increasing gas reading at or above the alarm 1 setpoint	<ul style="list-style-type: none"> Alarm 1 LED is on Gas reading alternates with ALARM-1 message 	Pulsing tone	Alarm 1 contacts change condition
Alarm 2 ¹	Increasing gas reading at or above the alarm 2 setpoint	<ul style="list-style-type: none"> Alarm 2 LED is on Gas reading alternates with ALARM-2 message 	Pulsing tone	Alarm 2 contacts change condition
Fail	<ul style="list-style-type: none"> Disconnected or misconnected infrared methane detector head wiring Display reading at -10% of full scale or lower Defective components 	<ul style="list-style-type: none"> Fail LED is on FAIL message replaces gas reading <p><i>NOTE: There is a 30 second delay on the fail indications.</i></p>	Steady tone	Fail relay contacts open
Low Flow	There is something blocking the aspirator's inlet or exhaust line.	The flowmeter indicates below 1.6 SCFH.	None	Low flow contacts close
Drain Fault	There is something blocking the drain line or the restrictor	None	None	Drain fault contacts close
Low Power	DC power source less than 18.5 volts.	<ul style="list-style-type: none"> Fail LED is on LowPower message and actual voltage of incoming DC power 	None	Fail relay contacts open
* ¹ <i>If the Beacon 110 is in both an alarm 1 and an alarm 2 condition, both alarm LEDs are on and the display alternates between the gas reading and the ALMS 1&2 message.</i>				

NOTE: You can select normally energized (N. EN) or normally de-energized (N. DE-EN) alarm 1 and alarm 2 relay settings in Configuration Mode. The following sections describe the standard factory setting for these relays which is N. DE-EN.

The fail relay is set as normally energized in the firmware and is not user-adjustable.

Alarm 1 Condition

Alarm 1 Condition Indications

When the gas reading reaches the alarm 1 setpoint, the Beacon 110 senses an alarm 1 condition. The Beacon 110 alerts you to an alarm 1 condition as follows:

- The alarm 1 LED turns on.
- The gas reading alternates with the **ALARM-1** message.
- The buzzer sounds a pulsing tone.
- The alarm 1 relay energizes.

Responding to an Alarm 1 Condition

1. Follow your established procedure for a low level combustible gas condition.
2. Alarms are factory set as 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 LED, returns the LCD to the normal operation screen, and de-energizes the alarm 1 relay.

NOTE: If the reset switch is pressed while the Beacon 110 is in an alarm 1 condition, the buzzer will be silenced and the alarm 1 LED will flash.

You cannot de-energize the alarm 1 relay until the gas reading falls below the alarm 1 setpoint.

Alarm 2 Condition

Alarm 2 Condition Indications

When the gas reading reaches the alarm 2 setpoint, the Beacon 110 senses an alarm 2 condition. The Beacon 110 alerts you to an alarm 2 condition as follows:

- The alarm 2 LED turns on.
- The gas reading alternates with the **ALARM-2** message.
- The buzzer sounds a pulsing tone.
- The alarm 2 relay energizes.

NOTE: If the Beacon 110 is in both an alarm 1 and alarm 2 condition, both the alarm 1 and alarm 2 LEDs will be on, the gas reading will alternate with the **ALMS 1&2** message, and both alarm relays will energize.

Responding to an Alarm 2 Condition

1. Follow your established procedure for a high level combustible gas condition.
2. Alarms are factory set as latching. After the gas reading falls below the alarm 2 setpoint, press the reset switch to reset the alarm circuit. Resetting the alarm circuit silences the buzzer, turns off the Alarm 2 LED, returns the LCD to the normal operation screen, and de-energizes the alarm 2 relay.

NOTE: If the reset switch is pressed while the Beacon 110 is in an alarm 2 condition, the buzzer will be silenced and the alarm 2 LED will flash but all other indications will remain unchanged.

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

Fail Condition

Fail Condition Indications

The Beacon 110 indicates a fail condition for any of the following:

- The infrared methane detector head wiring is disconnected or incorrectly connected.
- The display reading is -10% of full scale or lower.

When the Beacon 110 senses a fail condition, it alerts you as follows:

- The fail LED turns on.
 - The gas reading is replaced by the **FAIL** message.
 - The buzzer sounds a steady tone.
 - The fail relay de-energizes.
-

NOTE: The fail alarm has a 30 second delay.

Responding to a Fail Condition

NOTE: A fail condition cannot be reset using the reset switch.

1. Verify that the infrared methane detector head wiring is correctly and securely connected.
2. If necessary set the zero reading for the infrared methane detector head as described in “Calibration Mode” on page 42.

Low Flow Condition for 30-0954-265-01

Low Flow Condition Indications

When the 30-0954-265-01 senses a low flow condition:

- The flowmeter indicates below 1.6 SCFH.
- The low flow contacts are closed.

Responding to a Low Flow Condition

1. Check the 30-0954-265-01’s inlet and exhaust lines for blockages.
2. If necessary, perform a blowback operation as described in “Blowback Operation” on page 47.

Drain Fault Condition for 30-0954-265-01

Drain Fault Condition Indications

When the 30-0954-265-01 senses a drain fault condition:

- The drain fault contacts are closed.

Responding to a Drain Fault Condition

1. Check the 30-0954-265-01's drain line and restrictor for blockages.

Low DC Power Alarm

Low DC Power Alarm Indications

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

The Beacon 110 senses a DC low power condition when the DC power source is 18.5 volts or less.

WARNING: *While in a low power condition, the Beacon 110 is not an active gas monitor.*

When the Beacon 110 senses a low DC power condition, it alerts you as follows:

- The fail LED turns on.
- The message **LowPower** is indicated on the top line of the LCD and the input voltage is displayed on the bottom line of the LCD.

NOTE: The low DC power alarm cannot be cleared using the reset switch.

When the DC input voltage increases to 19.0 volts, the low DC power alarm is cleared and the Beacon 110 will begin its warm-up sequence.

Responding to a Low DC Power Condition

- If DC power is the **primary** power source:
 1. For a *temporary* DC power source, disconnect primary DC power at the Beacon 110, then connect a 24 VDC battery.
 2. Determine and correct the cause of primary DC power loss.

When the DC power source rises above 19.0 volts, the Beacon 110 begins the warm up process.
 3. Verify that the Beacon 110 enters normal operation after its warm-up sequence.
- If DC power is the **backup** power source:
 1. If a non-rechargeable battery is used for backup, replace the battery.
 2. Determine and correct the cause of primary AC power loss. When backup DC or primary AC power is restored, the Beacon 110 begins the warm up process.
 3. Verify that the Beacon 110 enters normal operation after its warm-up sequence.

Chapter 5: Configuration Mode

Overview

This chapter describes how to view and change Beacon 110 parameters using Configuration Mode. It is accessed using the program buttons.

NOTE: The Configuration Mode parameters are factory set and should not need user adjustment.

Configuration Mode includes a 5-minute time-out feature. If you do not press a control button for 5 minutes, the Beacon 110 automatically returns to normal operation.

NOTE: If the Beacon 110 returns to normal operation because of a time-out, it enters a warm-up period just as it does when it is first turned on.

If you are installing a new Beacon 110, it has been set up at the factory. Use Configuration Mode only if you want to change the Beacon 110's setup. If you want to change the detector type see "Chapter 6: Input Mode" on page 38.

Viewing & Changing Beacon 110 Parameters

1. While in normal operation, simultaneously press and hold the UP/YES and ENTER buttons for 5 seconds to enter Configuration Mode. Release the buttons when the following screen appears.

Enter
Config?

2. If you want to exit Configuration Mode, press and release the DOWN/NO button and the Beacon 110 will return to normal operation.

If you want to continue in Configuration Mode, press and release the UP/YES button. The target gas and the full scale will be displayed for a few seconds before the first adjustable parameter, the alarm 1 setpoint, is displayed.

3. If you want to change the currently displayed parameter, use the UP/YES and DOWN/NO buttons to adjust it to the desired setting, then press ENTER to continue to the next parameter.

If the currently displayed parameter is OK, press the ENTER button to proceed to the next parameter.

Table 6 lists the Beacon 110 parameters you can set. Table 6 also lists the factory set value for each parameter.

Table 6: Configuration Parameters

Parameter (Factory Set Value)	Description
ALARM-1 (level) (10% LEL)	The gas reading at which the Beacon 110 initiates an alarm 1 condition.
ALARM-1 (activation) (Increase)	Indicates if the alarm 1 circuit is activated by gas readings increasing (Increase) or decreasing (Decrease) to the ALARM-1 Level.
ALARM-1 (relay action) (N. DE-EN)	If set as N. DE-EN , the alarm 1 relay is de-energized in normal operation and energizes when an alarm 1 condition is initiated. If set as N. EN , the alarm 1 relay is energized in normal operation and de-energizes when an alarm 1 condition is initiated.
ALARM-1 (relay reset) (LATCH)	If set as LATCH , you must press the reset switch to reset the alarm 1 circuit after the alarm 1 condition passes. If set as SELF-RST , the Beacon 110 automatically resets the alarm 1 circuit after the alarm 1 condition passes.
A1Strobe (Non Reset)	If set as None , there is no strobe operation. If set as NonReset , it is not possible to turn off the strobe with the reset switch while the Beacon 110 is in an alarm 1 condition. If set as CanReset , the strobe can be turned off while the Beacon 110 is in an alarm 1 condition by pressing the reset switch.
A1 OnDy (alarm 1 on delay) (1 secs)	The amount of time the Beacon 110 delays activation of the alarm 1 circuit once an alarm 1 condition is initiated.
A1 OffDy (alarm 1 off delay) (0 sec.)	The amount of time the Beacon 110 delays turning off the alarm 1 circuit once an alarm 1 condition passes. This parameter appears only if the alarm 1 relay reset setting is set to SELF--RST .
ALARM-2 (level) (50% LEL)	The gas reading at which the Beacon 110 initiates an alarm 2 condition.
ALARM-2 (activation) (Increase)	Indicates if the alarm 2 circuit is activated by gas readings increasing (Increase) or decreasing (Decrease) to the ALARM-1 Level.
ALARM-2 (relay action) (N. DE-EN)	If set as N. DE-EN , the alarm 2 relay is de-energized in normal operation and energizes when an alarm 2 condition is initiated. If set as N. EN , the alarm 2 relay is energized in normal operation and de-energizes when an alarm 2 condition is initiated.
ALARM-2 (relay reset) (LATCH)	If set as LATCH , you must press the ENTER button to reset the alarm 2 circuit after the alarm 2 condition passes. If set as SELF-RST , the Beacon 110 automatically resets the alarm 2 circuit after the alarm 2 condition passes.
A2Strobe (Non Reset)	If set as None , there is no strobe operation. If set as NonReset , it is not possible to turn off the strobe with the reset switch while the Beacon 110 is in an alarm 2 condition. If set as CanReset , the strobe can be turned off while the Beacon 110 is in an alarm 2 condition by pressing the reset switch.

Table 6: Configuration Parameters (Continued)

Parameter (Factory Set Value)	Description
A2 OnDy (alarm 2 on delay) (1 secs)	The amount of time the Beacon 110 delays activation of the alarm 2 circuit once an alarm 2 condition is initiated.
A2 OffDy (alarm 2 off delay) (0 sec.)	The amount of time the Beacon 110 delays turning off the alarm 2 circuit once an alarm 2 condition passes. This parameter appears only if the alarm 2 relay reset setting is set to SELF-RST .
ZeroSupp (2.0% LEL)	The zero suppression feature helps prevent “jumpy” readings near the fresh air reading. For example, if the zero suppression setting for a combustible detector is 2.0% LEL , the Beacon 110 will display a reading of 0% LEL for gas readings from -2% LEL to 2% LEL.
FILTER (5 secs)	The filter feature helps “smooth out” jumpy or noisy signals from the detector. You can set the filter from 0 seconds to 60 seconds in 5 seconds increments. The displayed gas reading is the average reading over the previous time period defined by the filter setting. So if the filter is set to 5 seconds, the displayed gas reading is the average over the past 5 seconds.
CAL Time (15 mins)	The calibration time-out sets the amount of time after the last button push while in Calibration Mode that the Beacon 110 will wait before returning to normal operation. If the calibration time-out is set to 15 mins , then Beacon 110 will return to normal operation automatically 15 minutes after the last button push.

4. When you have scrolled through all the adjustable parameters, **SAVE IT? YES/NO** appears on the display.
5. To save the adjustments made, press and release the UP/YES button. **Config Saved** is indicated on the display for a few seconds and the Beacon 110 returns to normal operation.

If you do not wish to save the adjustments, press and release the DOWN/NO button. The **DO OVER? YES/NO** message will display. Press and release the DOWN/NO button. The **ABORT? YES/NO** message will display. Press the UP/YES button to return to normal operation.

Chapter 6: Input Mode

Overview

This chapter describes how to use Input Mode to select the Beacon 110's detector head input type and the gas type. The detector head input type determines whether a direct connect type or a 4 - 20 mA type of detector head will be used and the gas type determines the target gas and detection range.

NOTE: The Input Mode parameters are factory set and should not need user adjustment.

Input Mode includes a 5-minute time-out feature. If you do not press a button for 5 minutes, the Beacon 110 automatically returns to normal operation.

NOTE: If the Beacon 110 enters normal operation because of a program time-out, it enters a warm-up period just as it does when it is first turned on.

Selecting the Detector Head Input and Gas Type

1. While in normal operation or during the warm-up sequence, press and hold the UP/YES and DOWN/NO buttons for five seconds. Release them when the following screen appears.

Select
Input?

2. If you want to exit Input Mode, press and release the DOWN/NO button. The Beacon 110 will indicate **NO CHANGE** and return to normal operation without making any changes to the detector head input type or gas type.

If you want to continue in Input Mode, press and release the UP/YES button. The top display line will indicate **Input?** and the bottom display line will indicate the detector head input type choice.

3. Use the DOWN/NO button to scroll through the choices of input types. Table 7 below lists the choices of input type for the Beacon 110.

Table 7: Beacon 110 Detector Head Input Types

Detector Head Input Type	Description
OXY DIR	An OXY DIR detector head is an oxygen detector head in which the oxygen detector is wired to the Beacon 110 with 2 wires using the OXY GRN and WHT terminals from the detector/transmitter terminal strips. All calibration adjustments are made at the Beacon 110.
TOX DIR	A TOX DIR detector head is connected to the Beacon 110 with 2 wires using the AMP + and S terminals from the detector/transmitter terminal strips. All calibration adjustments are made at the Beacon 110.
LEL DIR	An LEL DIR detector head is a combustible gas detector head in which the combustible gas detector is wired to the Beacon 110 with 4 wires using the LEL BLK, GRN, WHT, and RED terminals from the detector/transmitter terminal strips. All calibration adjustments are made at the Beacon 110.
4 - 20 mA	A 4 - 20 mA detector head is connected to the Beacon 110 with 2 or 3 wires, depending on the detector head model, using the AMP +, S, and - terminals on the detector head terminal strip. All calibration adjustments are made at the detector head.

4. When the desired detector head input type is on the display, press and release the UP/YES button. The display will ask **SAVE IT? YES/NO**.
5. If you want to discard the detector head input type change, press and release the DOWN/NO button. The display will ask **DO OVER? YES/NO**. Press the DOWN/NO button. The display will ask **ABORT? YES/NO**. Press the UP/YES button. The display will indicate **Aborting INPUT** and then **NO CHANGE** before indicating **Select GasType?**.

NOTE: If your Beacon 110 is configured as direct connect oxygen and the detector head input type selection is aborted, the Beacon 110 will return to normal operation after indicating **NO CHANGE**.

If you want to save the input type selection, press and release the UP/YES button. The display will indicate **Input Updated** for a few seconds if you changed the input type and then the display will indicate **Gas Type?** on the top display line and the gas type choice on the bottom display line. If you did not change the input type from the current type, the display indicates **NO CHANGE** and then **Select GasType?**.

NOTE: If you selected OXY DIR, the Beacon 110 will enter Configuration Mode after pressing and releasing the UP/YES button since the gas type and full scale are pre-defined for a direct connect oxygen type input. Skip to step 10.

6. If you changed the input type above, you must select a gas type. Proceed to step 7.
 If you did not change the input type, you can decide if you want to select the gas type. If you do not want to select the gas type, press and release the DOWN/NO button. The display will indicate **NO CHANGE** and the Beacon 110 will return to normal operation with the previous setup. If you do want to select the gas type, press the UP/YES button and the display will indicate **GasType?** on the top display line and the gas type choice on the bottom display line.
7. Use the DOWN/NO button to scroll through the choices of gas types. When you come to the desired choice, press the UP/YES button to select it.
 If you selected one of the defined gas types such as OXYGEN or CO, the display will ask **SAVE IT? YES/NO**. Proceed to step 8.
 If you selected the OTHER gas type, the display will indicate **GAS NAME** on the top display line and bottom line will be blank with the cursor flashing in the far left. Proceed to step 9.
8. If you did not change the input type above and want to discard the gas type selection, press and release the DOWN/NO button. The display will ask **DO OVER? YES/NO**. Press the DOWN/NO button. The display will ask **ABORT? YES/NO**. Press the UP/YES button. The display will indicate **Aborting Gas Type**, then **NO CHANGE** and the Beacon 110 will return to normal operation.
 If you want to save the gas type selection, press and release the UP/YES button. The display will indicate **Gas Type Updated**, show the target gas and the detection range for a few seconds, then the Beacon 110 will enter Configuration Mode so that the parameter settings in Configuration Mode can be verified or changed.
9. Perform the following steps to define the gas name, detection range, and units if you selected the OTHER gas type.
 - With **GAS NAME** on the top display line and the cursor flashing in the far left on the bottom display line, use the UP/YES and DOWN/NO buttons to select a character for the first character of the gas name and press ENTER to save it. The cursor will move to the next position. Repeat this process until the last character is saved.
 - The display will ask **SAVE IT? YES/NO**. Press and release the UP/YES button. The display will indicate **RANGE . . .** on the top display line prompting you to enter a full scale value and the bottom line will be blank with the cursor flashing on the far left.
 - Use the UP/YES and DOWN/NO buttons to enter a number for the first digit of the full scale value and press ENTER to save it. The cursor will move to the next position. Repeat this process until you have entered the full scale value, for example 30.0, leaving extra positions blank before pressing ENTER.
 - When you have pressed ENTER for the last time, the display will ask **SAVE IT? YES/NO**. Press and release the UP/YES button. The display will indicate **UNITS?** on the top line and the units choice on the bottom line of the display.
 - Use the DOWN/NO button to scroll through the choices until you find the desired units. (If you select the OTHER choice, perform the same procedure described above for entering the gas name and range.)
 - Press the UP/YES button to save the units. The Beacon 110 will proceed to Configuration Mode.

10. While in Configuration Mode press and release the ENTER button to accept the displayed parameter setting and move to the next one. Use the UP/YES and DOWN/NO buttons to adjust a setting. See “Chapter 5: Configuration Mode” on page 35 for a complete description of Configuration Mode.
11. When you have reviewed and accepted the last item in Configuration Mode by pressing the ENTER button, display will ask **SAVE IT? YES/NO**.
12. To save the configuration settings, press and release the UP/YES button. The display will indicate **Config Saved** and the Beacon 110 will begin its warm-up sequence.

To discard the settings and review them again, press the DOWN/NO button. The display will ask **DO OVER? YES/NO**. Press the UP/YES button and the display will indicate **Re-do Config**, then display the target gas and the detection range for a few seconds before returning to Configuration Mode. Repeat steps 6 - 8 until the settings are as desired.
13. After the Beacon 110 completes its warm-up sequence, the display will indicate **CAL NEEDED**, the buzzer will sound a steady tone, the fail relay will activate, and the fail LED will turn on. Since the input type and/or gas type has been changed, a successful calibration must be performed before the Beacon 110 can enter normal operation.

NOTE: If the input type was set as 4 - 20 mA, the Beacon 110 will enter normal operation since calibration is done at the detector for a 4 - 20 mA type input.

14. Press and release the UP/YES button to enter Calibration Mode. Normally, you must hold the UP/YES button for 5 seconds to enter Calibration Mode, but since a calibration is required, only a momentary push is needed to enter Calibration Mode after changing the gas type.
15. See “Calibration Mode” on page 42 for calibration instructions.

NOTE: When calibrating a Beacon 110 after changing the gas type, the Beacon 110 will not ask if you want to calibrate, or whether you want to perform a fresh air adjustment, span adjustment or zero adjustment. Since a complete calibration is required, the calibration sequence will proceed without asking if you want to perform certain operations.

Chapter 7: Maintenance

Overview

This chapter describes calibration, maintenance, preventive maintenance, and has a troubleshooting guide.

Calibration Frequency

Although there is no particular calibration frequency that is correct for all applications, a calibration frequency of every 6 months is adequate for most 30-0954-265-01 applications. Unless experience in a particular application dictates otherwise, RKI Instruments, Inc. recommends a calibration frequency of every 6 months.

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

If an application is very demanding, for example if the environment is not well controlled, then more frequent calibration than every 6 months may be necessary.

Calibration Mode

The Beacon 110's Calibration Mode is used to calibrate the 30-0954-265-01's infrared methane detector head.

The following procedure assumes the use of a calibration kit which includes a calibration gas cylinder, a zero air cylinder, a fixed flow regulator with an on/off knob, and a gas bag.

NOTE: A gas bag is recommended for calibration instead of a demand flow regulator because a demand flow regulator introduces enough flow restriction to significantly reduce the flow. If a demand flow regulator is used, the flow will have to be adjusted up to 3.0 SCFH while the regulator is connected during calibration and down to 3.0 SCFH after calibration.

Calibration Gas Response Memory Feature

When a direct connect detector head is installed, the Beacon 110 has the capability to “remember” the detector's response to the calibration gas after the gas is removed from the detector during the fresh air or span adjustment procedure. When zero air is applied to the detector during a fresh air adjustment, the Beacon 110 will freeze the display reading at the lowest response and the Beacon 110 will continue to display this reading and retain it in its memory until the fresh air adjustment procedure is completed. When calibration gas is applied to the detector during a span adjustment, the Beacon 110 will freeze the display reading at the highest response to the calibration gas. The calibration gas can then be removed and the Beacon 110 will continue to display this reading and retain it in its memory until the span adjustment procedure is completed.

Calibration Program Flow

Figure 13 below illustrates the general flow of the Calibration Program. See the next section, “Preparing for Calibration”, for instructions to enter Calibration Mode. In general, if a question mark, “?”, is part of the display text, use the UP/YES or DOWN/NO button to respond. Use the UP/YES and DOWN/NO buttons to increase or decrease a displayed gas reading when performing a span operation, and use the ENTER button to accept a displayed value and continue.

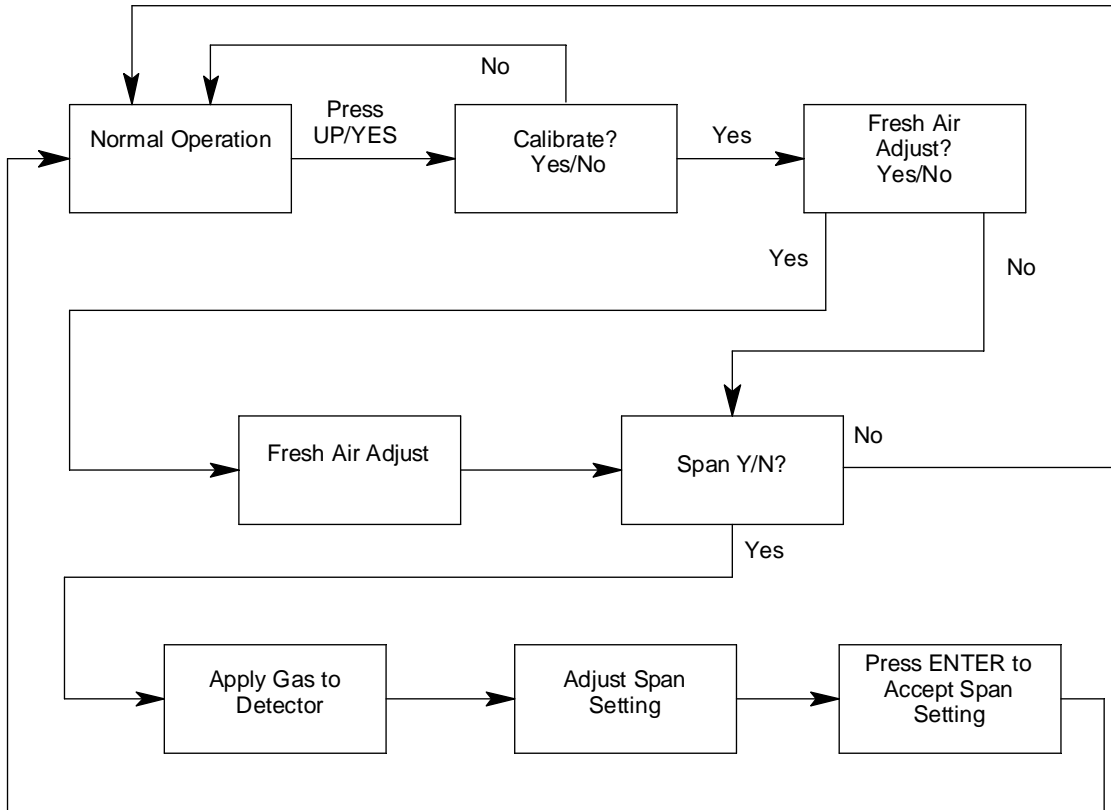


Figure 13: Calibration Mode Flow Chart

Preparing for Calibration

WARNING: *The Beacon 110 is not an active gas monitoring device during the calibration procedure. The 4-20 mA output signal will “freeze” at 3.5 mA and all relays will remain in their non-alarm state while the Beacon 110 is in Calibration Mode. The 4 - 20 mA output signal will not indicate current readings and the relays will not resume operating normally until the Beacon 110 is in normal operation again.*

1. While in normal operation, press and hold the UP/YES button for 5 seconds to enter Calibration Mode. Release the button when the following screen appears.

Calib?
YES/NO

2. If you want to exit Calibration Mode, press and release the DOWN/NO button. The Beacon 110 will indicate **Leaving CAL Mode** and the Beacon 110 will return to normal operation.

If you want to continue with calibration, press and release the UP/YES button. The display will indicate the target gas and **CAL Mode** for a few seconds before showing **FreshAir Adjust?**.

3. Screw the regulator into the calibration cylinder.

Performing a Zero Adjustment

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

1. The display will indicate **FreshAir Adjust?** as described above in “Preparing for Calibration”.
2. If you want to skip adjusting the fresh air reading, press and release the DOWN/NO button. The display will indicate **SPAN w/Cal Gas?**. Skip to “Performing a Span Adjustment”.

If you want to continue with adjusting the fresh air reading, press and release the UP/YES button. **ENTER** will alternate with **FreshAir** on the top display line and the current gas reading will be on the bottom display line.

3. Attach the gas bag to the regulator on the zero air calibration cylinder. Be sure the hose clamp is open.

NOTE: A demand flow regulator cannot be used for calibration.

4. Turn the regulator’s on/off knob clockwise to open it. Fill the gas bag.
5. Turn the regulator’s on/off knob counterclockwise to close it.
6. Clamp the gas bag shut.
7. Connect the sample bag tubing to the hose barb calibration fitting on the calibration valve and release the hose clamp.
8. Push and hold the button on the calibration valve to start the flow of gas through the calibration gas fitting.
9. If necessary, use the regulator on the aspirator adapter to adjust the adapter’s flowrate to 3.0 SCFH.
10. Allow the sample draw adapter to draw sample for 2 minutes. The Beacon 110 will freeze the display reading at the lowest level reached while applying zero air.
11. Press and release the ENTER button. The Beacon 110 will perform a fresh air adjustment and the display will indicate **SPAN w/Cal Gas?**.
12. Release the push button on the calibration valve. Disconnect the sample bag from the calibration fitting.
13. Empty the gas bag.

Performing a Span Adjustment

1. If you want to skip adjusting the span setting, press and release the DOWN/NO button. The display will indicate **Leaving Cal Mode** and the Beacon 110 will return to normal operation.

If you want to continue with adjusting the span setting, press and release the UP/YES button. **APPLY** will alternate with **SPAN Gas** on the top display line and the current gas reading will be on the bottom display line.

2. Screw the regulator into the calibration cylinder.
3. Attach the gas bag to the regulator. Be sure the hose clamp is open.
4. Turn the regulator's on/off knob clockwise to open it. Fill the gas bag.
5. Turn the regulator's on/off knob counterclockwise to close it.
6. Clamp the gas bag shut.
7. Connect the sample bag tubing to the hose barb calibration fitting on the calibration valve and release the hose clamp.
8. Push and hold the button on the calibration valve to start the flow of gas through the calibration gas fitting.
9. If necessary, use the regulator on the aspirator adapter to adjust the adapter's flowrate to 3.0 SCFH.
10. Allow the sample draw adapter to draw sample for 2 minutes. The Beacon 110 will freeze the display reading at the highest level reached while applying calibration gas.
11. Remove the gas bag from the calibration fitting and release the push button on the calibration valve. The Beacon 110 will continue to display the maximum gas response on the display and retain the response level in its memory.
12. Adjust the gas reading up or down to match the calibration gas cylinder concentration by using the UP/YES and DOWN/NO buttons, then press and release the ENTER button.
13. The Beacon 110 will perform a span operation. The display will indicate **SPAN Gas PASS** for a few seconds, then indicate **SPAN Gas SAVED** before indicating **Leaving CAL Mode** for a few seconds.

Returning to Normal Operation

1. The display will now alternate between the normal operation screen and the message **REMOVE CAL GAS** for 1 minute. If the calibration gas has not been removed from the detector, remove it now to avoid unwanted alarms.

During this 1 minute period, the 4 - 20 mA output will remain fixed at 3.5 mA and the relays will remain in their non-alarm state to avoid unwanted alarms while the calibration gas clears from the detector. At the end of the 1 minute period, the **REMOVE CAL GAS** message will stop appearing and the Beacon 110 will return to normal operation.

2. Unscrew the regulator from the calibration cylinder.
3. If necessary, use the regulator on the aspirator adapter to adjust the adapter's flowrate to 3.0 SCFH.
4. Store the components of the calibration kit in a safe place.

Replacing the Infrared Methane Detector

1. Turn the regulator adjustment knob completely counterclockwise.
2. Turn off or unplug all incoming power to the Beacon 110.
3. Open the housing door of the Beacon 110, then place the power switch in the OFF position.
4. Remove the junction box cover.
5. Disconnect the detector leads from the terminal block in the junction box. Note the position of the color-coded leads as you remove them.
6. Loosen the thumbscrews that attach the detector chamber to the detector adapter.

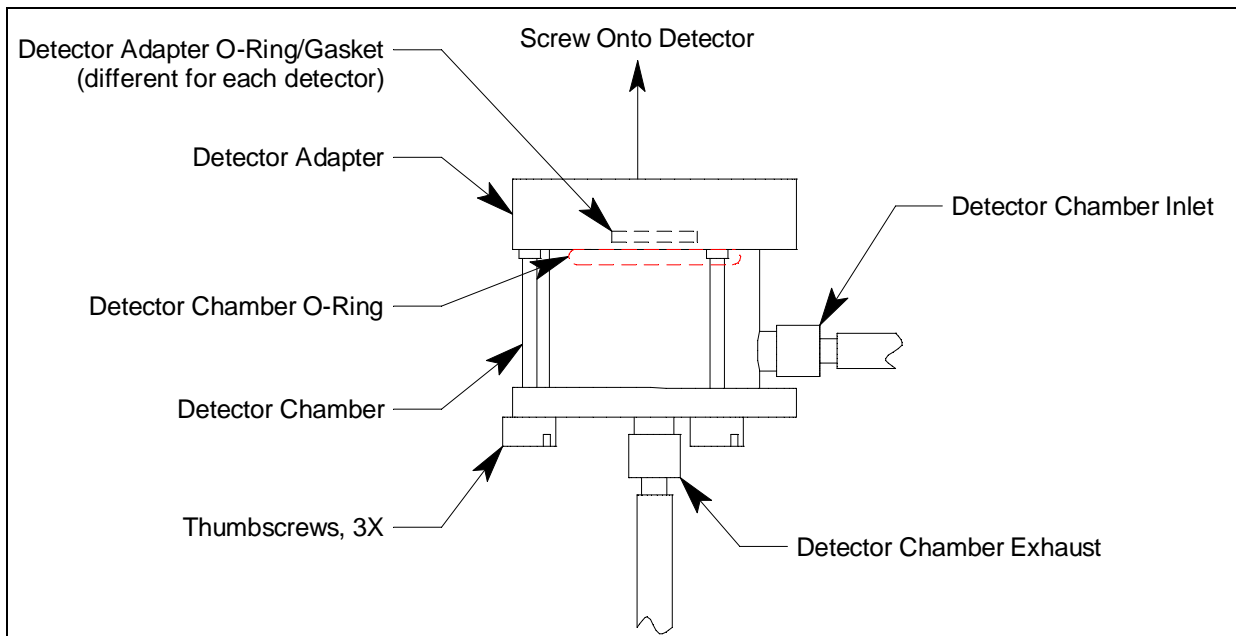


Figure 14: Detector Chamber/Detector Adapter Assembly

7. Pull the detector chamber away from the detector adapter and let it hang by its inlet and exhaust lines.
8. Unscrew the infrared methane detector from the junction box conduit hub.
9. Guide the detector leads of the replacement infrared methane detector through the junction box conduit hub, then screw the mounting threads of the infrared methane detector into the hub. If necessary for environmental conditions, apply thread sealant or Teflon tape to the hub and/or infrared methane detector threads to seal them.
10. Connect the infrared methane detector leads to the terminal block the same way the old detector was wired (see Figure 10).
11. Screw the detector adapter onto the new infrared methane detector hand tight.
12. Reinstall the detector chamber into its appropriate position and tighten the thumbscrews.
13. Reinstall the junction box cover.
14. Plug in or turn on all incoming power to the Beacon 110.

15. Place the Beacon 110's power switch in the ON position, then verify that the Beacon 110 completes its warm-up sequence and enters normal operation.
16. Turn the regulator adjustment knob clockwise until the flowmeter indicates 3.0 SCFH.

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

17. Calibrate the replacement infrared methane detector as described in the Calibration section of this manual.

Blowback Operation

1. In the event of a clogged sample line, the blowback valve can be used to divert the compressed air supply back through the sample line to clear obstructions.
2. Inspect the sample line first to try to remedy the situation without using the blowback valve. If the line cannot be cleared, operate the blowback valve as described below.
3. Make sure that all personnel and equipment are clear of the inlet end of the sample line.
4. To operate the blowback valve, press and hold the blowback valve button. As long as the button is held, compressed air will be applied to the sample line.

WARNING: *The blowback pressure can be as high as 140 psi. Make sure that all personnel and equipment are clear of the sample line inlet end to avoid personal injury or equipment damage if a sample line obstruction is blown out of the sample line.*

5. Release the blowback valve button. Verify that the sample is now flowing properly through the sample line.

Setting the Drain Fault Switch

The drain fault switch is factory set to detect a break in the drain line or very low drain flow from the water trap during operation. Under normal circumstances, it should not be necessary to adjust the drain fault switch in the field. If the drain fault switch contacts close to indicate a problem in the drain line and no cause can be determined, it may be necessary to adjust the drain fault switch. If the drain fault switch contacts are not operating properly, perform the following procedure to set the drain fault switch. If the drain fault switch contacts continue to operate improperly, contact RKI Instruments, Inc.

NOTE: In order to get an accurate open/close reading on the drain fault switch contacts, the low flow and drain fault switches must not be wired in parallel. Any monitoring device must also be disconnected from the drain fault switch contacts. Remove any jumpers and monitoring device wires from the drain fault switch contacts before setting the drain fault switch.

1. Ensure that the flowmeter reading is 3.0 SCFH.

2. Open the enclosure and connect an ohm meter to the drain fault switch terminals on the terminal block. Check that the contacts are open during normal operation.
3. Using the regulator, adjust the flow down until the flowmeter reads 1.0 SCFH.
4. Carefully adjust the drain fault switch using the adjustment screw until the contacts just close.
5. Adjust the flow back above 1.0 SCFH with the regulator and repeat step 3 until the contacts close between 0.8 and 1.0 SCFH. To increase the setpoint, turn the adjustment screw slightly counterclockwise. To decrease the setpoint, turn the adjustment screw slightly clockwise.
6. Adjust the flow back up above 1.0 SCFH. The contacts should reopen.
7. Adjust the flowrate to 3.0 SCFH.
8. Reconnect any wires that were removed before setting the drain fault switch. Refer to Figure 11 and Figure 12 for wiring diagrams.

Replacing the Water Trap's Filter Element

1. Turn the regulator adjustment knob completely counterclockwise.
2. Locate the water trap. It is in the lower right corner of the sample-draw aspirator panel.
3. Disconnect the black, flexible tubing from the bottom of the water trap.
4. Grasp the glass bowl of the water trap and unscrew it from the water trap lid. Be sure the O-ring that seals the glass bowl does not come out of the lid.
5. Unscrew the filter element holder from the water trap lid.
6. There is a circular, black deflector with a gasket on top of it that may come out when you remove the filter element holder. It has ridges along the outside edge. Do not lose the deflector or the gasket.
7. Remove the cylindrical water trap element.
8. Install a new filter element onto the filter element holder being sure that the grooved side of the element is facing down and gets inserted into the holder. The exposed end of the filter element should be smooth.
9. If the deflector and/or gasket came out when you removed the filter element holder, install the deflector on top of the filter element being sure that the deflector is curving down toward the filter element. Install the gasket over the deflector.
10. Screw the filter element holder back into the water trap lid.
11. Screw the glass bowl back into the water trap lid.
12. Reattach the black, flexible tubing to the bottom of the water trap.
13. Turn the regulator adjustment knob clockwise until the flowmeter indicates 3.0 SCFH.

Replacing the Fuses

The Beacon 110 has two replaceable AC fuses.

NOTE: To replace other components of the Beacon 110, contact RKI Instruments, Inc. for further information.

1. Turn off or unplug all incoming power to the Beacon 110.
2. Open the housing door of the Beacon 110, then place the power switch in the OFF position.
3. Locate the vertical fuse holders above the AC In Terminal Strip. The AC fuses are labelled F1 and F2 on the main PCB silkscreen.
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. See the “Parts List” on page 52 for correct fuse.*

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 110.
9. Place the Beacon 110’s power switch in the ON position, then verify that the Beacon 110 completes its warm-up sequence and enters normal operation.
10. Close and secure the housing door.

Preventive Maintenance

Preventive maintenance of the Beacon 110 consists of daily and biannual procedures to ensure that the 30-0954-265-01 is operating properly.

Daily

Verify a display reading of 0% LEL at the controller. Investigate significant changes in the reading.

Biannually

Calibrate the detector as described in “Calibration Mode” on page 42.

Troubleshooting

The troubleshooting guide describes symptoms, probable causes, and recommended action for problems you may encounter with the 30-0954-265-01.

Table 8: Troubleshooting the 30-0954-265-01

Condition	Symptom(s)	Probable Causes	Recommended Action
No Power	<ul style="list-style-type: none"> The display backlight is off and the display screen is blank. 	<ul style="list-style-type: none"> The power wiring is disconnected or misconnected. One or both AC fuses is blown. The display cable is disconnected or misconnected. 	<ol style="list-style-type: none"> Verify that the wiring to the power source is correct and secure. At the Beacon 110, verify that the wiring to the AC terminals is correct and secure. Check the continuity of the AC fuses. Verify that the display cable is connected. The display (ribbon) cable plugs into a connector on the top edge of the control PCB and on the main PCB below the control PCB. If the power difficulties continue, contact RKI for further instruction.
Frequent or Suspect Alarms	<ul style="list-style-type: none"> The Beacon 110 alerts you to frequent or suspect alarms while the detector head's fresh air readings remain on zero. 	<ul style="list-style-type: none"> The Beacon 110 is experiencing false readings due to RFI or EMI. The detector head wiring is disconnected, misconnected, or intermittent. 	<ol style="list-style-type: none"> Verify that the detector head wiring is properly shielded. Verify that the detector head wiring is correct and secure. Verify that power and detector head wiring is routed through separate conduit hubs on the bottom of the Beacon 110 housing. Increase the alarm on delay setting in Configuration Mode. If the frequent or suspect alarm difficulties continue, contact RKI for further instruction.
Flickering Display	<ul style="list-style-type: none"> The display reading flickers often. 	<ul style="list-style-type: none"> The Beacon 110 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. 	<ol style="list-style-type: none"> Verify that the detector head wiring is properly shielded. Verify that the detector head wiring is correct and secure. Verify that power and detector head wiring is routed through separate conduit hubs on the bottom of the Beacon 110 housing. Increase the filter setting in Configuration Mode. Increase the zero suppression setting in Configuration Mode. If the display difficulties continue, contact RKI for further instruction.

Table 8: Troubleshooting the 30-0954-265-01 (Continued)

Condition	Symptom(s)	Probable Causes	Recommended Action
Buzzer Not Working	<ul style="list-style-type: none"> The buzzer does not sound an audible alarm during alarm conditions. The buzzer sounds weak or broken. 	<ul style="list-style-type: none"> The buzzer is disconnected or misconnected. The buzzer is malfunctioning. 	<ol style="list-style-type: none"> Verify that the wiring to the ALARM BUZZER + & - terminals of the Controller Terminal Strip is correct and secure. If the buzzer difficulties continue, contact RKI for further instruction.
Reset Switch Not Working	<ul style="list-style-type: none"> The buzzer does not silence when you press the reset switch. The alarm 1 or alarm 2 circuit does not reset when you press the reset switch after the alarm condition passes. 	<ul style="list-style-type: none"> The reset switch is disconnected or misconnected. The reset switch is malfunctioning. 	<ol style="list-style-type: none"> Verify that the wiring to the ALARM RESET (2) terminals of the Alarm/Controller Terminal Strip is correct and secure. If the reset switch difficulties continue, contact RKI for further instruction.
Fail Condition	<ul style="list-style-type: none"> Beacon 110 indicates a fail condition. 	<ul style="list-style-type: none"> The detector wiring is disconnected or misconnected. The detector zero signal is low enough to cause a fail condition. The detector is malfunctioning. 	<ol style="list-style-type: none"> Verify that the detector wiring is correct and secure. Calibrate the detector. If the fail condition continues, replace the detector. If the fail condition continues, contact RKI for further instruction.
Low Flow Condition	<ul style="list-style-type: none"> The flowmeter indicates below 1.6 SCFH and the low flow contacts are closed. 	<ul style="list-style-type: none"> There is something blocking the aspirator adapter's inlet or exhaust line. 	<ol style="list-style-type: none"> Check the aspirator adapter's inlet and exhaust lines for a blockage. If necessary, perform a blowback operation as described in "Blowback Operation" on page 47.
Slow or No Response/ Difficult or Unable to Calibrate	<ul style="list-style-type: none"> Unable to accurately set the zero or response reading during calibration. Detector requires frequent calibration. <p><i>Note: Under "normal" circumstances, the detector requires calibration once every six 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 calibration gas is not an appropriate concentration. The detector is malfunctioning. 	<ol style="list-style-type: none"> Verify that the calibration cylinder contains an adequate supply of a fresh test sample. Verify that the calibration gas concentration is appropriate for the detector. If the calibration/response difficulties continue, replace the detector. If the calibration/response difficulties continue, contact RKI for further instruction.

Parts List

Table 9 lists replacement parts and accessories for the 39-0954-265-01.

Table 9: Parts List

Part Number	Description
06-1248RK-03	Tubing, 3/16 x 5/16, polyurethane, 3 foot length, for calibration kit
07-7151RK	O-ring, for junction box
07-7218RK	O-ring, for detector adapter
07-7225RK	O-ring, 1.243 ID x .139, buna, for detector chamber
10-5153RK	Lid locking set screw, for junction box
13-1070RK	Captive panel screw, 10-32 x 1.75
18-0107RK	Conduit hub (3/4 in.)
18-0416RK-10	Junction box with cover, stainless steel
33-0413RK-02	Filter element for water trap
33-0413RK-10	Water trap
43-0440RK	Reset switch
43-4165RK	AC Fuse, 1/4" x 1 1/4", fast acting, 3A, 250 V
52-1016RK	Buzzer
61-0190RK-CH4	Methane infrared LEL detector
71-0464	30-0954-265-01 Operator's Manual (this document)
81-0012RK-01	Calibration cylinder, 50% LEL methane in air, 34 liter steel
81-0012RK-03	Calibration cylinder, 50% LEL methane in air, 103 liter steel
81-0076RK-01	Zero air calibration cylinder, 34 liter steel
81-0076RK-03	Zero air calibration cylinder, 103 liter
81-1001RK	Dispensing valve, for 34 liter steel cylinders
81-1051RK-60	Regulator with gauge and knob, 6 LPM, for 34 liter aluminum cylinder, 58 liter aluminum or steel, and 103 liter aluminum or steel cylinder
81-1127RK	Gas bag with fittings and hosebarb, 12 inches x 12 inches, 5 liters, tedlar

Appendix A: Control Button Quick Reference Guide

The Beacon 110's control buttons and reset switch allow access to operational modes, resetting of alarms, and display of the Information Screen. Table 10 shows which button combinations perform these functions and which parameters are available for adjustment while in the operational modes. While in these modes, display prompts showing a "?" require you to respond by pressing either the UP/YES (for yes) or DOWN/NO (for no) button. To change parameter settings, use the UP/YES and DOWN/NO buttons to get the desired setting, then press and release the ENTER button to accept the setting.

Table 10: Control Button Quick Reference Chart

Mode Entered or Function Performed	Button Combination	Adjustable or Viewable Parameters
Alarm Reset	Press and Release the Reset Switch	n/a
Min/Max	Press and Hold the Reset Switch for 3 seconds	Minimum and maximum readings can be viewed and reset.
Show Information Screen	Press and Hold DOWN/NO	<ul style="list-style-type: none"> Operating DC Voltage. For AC powered units, this is the DC voltage from the power supply. Beacon 110 Version/Revision Information
Calibration Mode	Press and Hold UP/YES for 5 seconds	<ul style="list-style-type: none"> Fresh Air Adjust Span Adjust with Calibration Gas
Configuration Mode	Press and Hold UP/YES & ENTER for 5 seconds	<ul style="list-style-type: none"> Alarm Levels Increasing or Decreasing Alarms Normally Energized or Normally De-energized Relays Latching or Self-resetting Alarms Strobe operation (if installed) Alarm On Delay Alarm Off Delay (if self-resetting) Zero Suppression Noise Filter Calibration Time-out Period
Input Mode	Press and Hold UP/YES and DOWN/NO for 5 seconds	Define Detector Head Input