



**Model  
LBW-50  
Ammonia Leak Detectors**



1441 Rice Street, St. Paul, MN 55117-3899 USA

Phone (651) 487-8844 Fax (651) 487-8857

info@coolairinc.com

www.coolairinc.com

**CAUTION & SYMBOL DEFINITIONS:**


**CAUTION:** Gives detailed description of different situations to avoid or not avoid for the proper operation of the equipment.



**WARNING:** RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER TO QUALIFIED SERVICE PERSONNEL.

**AVIS:** RISQUE DE CHOC ELECTRIQUE. NE PAS ENLEVER LE COUVERCLE. AUCUN ENTRETIEN DE PIECES INTERIEURES PAR L'USAGER. CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE.

**LBW-50 SPECIFICATIONS (cont'd)**

|                  |   |
|------------------|---|
| Pollution Degree | 1   |
| Approvals        | <p>Tested to UL 61010-1:2004 R7.05<br/>CAN/CSA-C22.2 61010-1:2004</p> <p style="text-align: center;"> <br/>                 By TUV<br/>                 Certificate no. Pending             </p>       |
| Options          | <ol style="list-style-type: none"> <li>1. Remote ammonia sensor with box and cable (500 ft. max.)</li> <li>2. Back-up battery</li> <li>3. Stainless-steel washdown tube</li> <li>4. Remote alarm light and horn unit with box, cable, &amp; TEST/NORMAL/SILENCE toggle switch.</li> </ol> |

**LBW-50 SPECIFICATIONS**

|                               |   |
|-------------------------------|---|
| Ammonia Detection Sensitivity | 25 to 800 PPM   |
| Ammonia Sensor                | Metal oxide semiconductor<br>833 mW integral heater<br>Alumina ceramic base<br>100 mesh SUS 316 double gauge flame arrestor   |
| Relays                        | Alarm, Pre-Alarm, and Auxiliary (auxiliary relay operates at same time as alarm relay)<br>Form C (SPDT), normally-open, normally-closed, energized in normally-open state.<br>Rated 5A, 115 VAC or 24 VDC |
| Outputs                       | Contacts for: alarm, pre-alarm, and auxiliary relays, and external temperature sensor   |
| Operating Temperature         | -50°F to 125°F  |
| Operating Humidity            | 5% to 95% RH, non-condensing  |
| Power Requirements            | 115/230 VAC, 60 Hz, 0.12 Amps max. or 24 VDC, 0.58 Amps max. or 16VAC, 0.65 Amps max.   |
| Dimensions:                   | 7-1/2"H x 7-1/2"W x 4-1/2"D   |
| Weight:                       | 4 lbs.  |
| Enclosure:                    | NEMA 4X rated, UL listed, CSA, IEC, IP66  |

**TABLE OF CONTENTS**

**IMPORTANT—READ THIS FIRST** ..... 4

**CAUTIONS**.....4

**AVOIDING NUISANCE ALARMS**.....4

**INTRODUCTION**..... 5

**STANDARD FEATURES** ..... 5

**AVAILABLE OPTIONS** ..... 6

**PARTS DESCRIPTION**..... 7

**FRONT PANEL DISPLAY** .....7

**AMMONIA SENSOR**.....8

**FRONT PANEL-MOUNTED CIRCUIT BOARD**.....8

**SERVICE SWITCH (SERVICE MODE)**.....9

**ADJUSTABLE ALARM POTENTIOMETER**.....9

**LED TEST BUTTON**.....9

**LOCAL/REMOTE JUMPERS**.....9

**RELAY LED'S**.....9

**ENCLOSURE-MOUNTED COMPONENTS**.....11

**RELAYS**.....12

**RELAY STATUS LED'S**.....12

**EXTERNAL CONNECTIONS**.....12

**WIRING DIAGRAMS**.....13

    Typical 115 VAC Application.....14

    Typical 230 VAC Application.....15

    Typical 16 VAC or 24 VDC Application.....16

**INSTALLATION AND SETUP**..... 17

**EXAMPLE APPLICATION** .....18-19

**REMOTE SENSING**..... 20

**REMOTE ALARM**.....21

**BACKUP BATTERY**.....22

**TABLE OF CONTENTS (Cont.)**

**TESTING AND CALIBRATION**..... 24-25

**TECHNICAL SUPPORT** ..... 26

**WARRANTY**..... 27

**LBW-50 SPECIFICATIONS** ..... 28-29

**WARRANTY**

The LBW-50 comes with a 12-month warranty from the time of purchase.

Cool Air Incorporated guarantees that the LBW-50 ammonia leak detector, when connected to and operated in accordance with the instructions contained in this manual, will perform in accordance with the warranty expressed on the cover of the detector. Not installing, maintaining, repairing, or operating the detector in accordance with the instructions in this manual will automatically void the warranty.

Cool Air Incorporated will not be held liable for any losses, liabilities, judgments, attorney fees, claims, or damages, including incidental and consequential damages.

**THE DETECTOR MUST BE TESTED AT LEAST ONCE A MONTH AND CALIBRATED AT LEAST ONCE A YEAR TO ENSURE IT IS OPERATING ACCURATELY AND CORRECTLY. TEST AND CALIBRATION RECORDS MUST BE RECORDED ON APPROPRIATE LOG SHEETS.**

## TECHNICAL SUPPORT

For technical support, contact Cool Air Incorporated using any of these methods:

Contact: Sales Representative  
Phone: (651) 487-8844 (USA)  
Fax: (651) 487-8857 (USA)  
E-mail: info@coolairinc.com  
Web site: www.coolairinc.com  
Address: Cool Air Incorporated  
1441 Rice Street  
St. Paul, MN 55117-3899  
USA

## IMPORTANT—READ THIS FIRST

### PLEASE READ AND UNDERSTAND THIS SECTION BEFORE INSTALLING AND OPERATING THE LBW-50 DETECTOR

#### CAUTION:

Operating the detector in lower temperatures will slow the detector response rate, and high humidity or excessive heat can cause the “Minimal Concentration” LED to light.

After applying power, test the detector to ensure it is operating correctly. Be sure the detector has been powered for at least 8 hours before testing.

Adequately cover the detector sensor during washdown, and avoid spraying the washdown liquid directly onto the sensor.

#### Avoiding Nuisance Alarms

To avoid nuisance alarms, place the detector in service mode before:

- Adjusting the Alarm setpoint.
- Performing maintenance, repairs, testing, or calibration.
- Performing maintenance on nearby compressor systems.
- Painting and/or cleaning nearby.
- Performing refrigeration system maintenance.
- Washing down the area.
- Removing the ammonia sensor.

Furthermore, be sure of the following before placing the detector in normal operating mode:

- The ammonia concentration reading is below the Alarm setpoint.

## INTRODUCTION

The Cool Air Incorporated LBW-50 is an AC/DC powered state-of-the-art ammonia leak detector that detects and displays ammonia concentrations of 25 to 800 parts per million (PPM). It comes equipped with a solid-state, long-life ammonia sensor that has a quick and accurate response to ammonia concentrations.

## STANDARD FEATURES

The LBW-50 comes with these additional standard features:

- Adjustable Alarm setpoint..
- Normally-open, normally-closed contacts for communicating with common industry alarm systems.
- A NEMA 4X, UL-listed enclosure.
- Spare contacts for operating auxiliary equipment such as exhaust fans, king valves, compressors, and additional alarm systems.
- Service mode which allows for testing and calibrating without setting off the alarms.

the relays de-energize. Adjusting clockwise shall cause the LED lamps to light up from the bottom to the top. Adjusting counter-clockwise shall cause the LED lamps to turn off from the top to the bottom.

7. Remove the ammonia test bottle, tighten the cap on the bottle, check-off the schedule number on the bottle, and enter the information on the enclosed log form.
8. Remember, slide the service switch to the "NORMAL" position. this step is only required if the service switch was turned to the "SERVICE" position in step # 4 above.
9. Congratulations! You have successfully calibrated your Cool Air Incorporated LBW-50 Ammonia Leak Detector. We recommend this calibration to be performed once a year using a new ammonia test bottle. These can be purchased from your local Cool Air Incorporated distributor or directly from the manufacturer.

**FIELD CALIBRATION (ONCE A YEAR):**

1. Visually inspect the leak detector for any corrosion, damage, etc. that could possibly affect the calibration procedure.
2. **Make sure that the leak detector is powered up for a minimum of 8-hours before the calibration procedure is performed.**



**WARNING: RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER TO QUALIFIED SERVICE PERSONNEL.**

**AVIS: RISQUE DE CHOC ELECTRIQUE. NE PAS ENLEVER LE COUVERCLE. AUCUN ENTRETIEN DE PIECES INTERIEURES PAR L'USAGER. CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE.**

3. Push the test button (see attached picture for location) and make sure that all of the LED lamps light up and the relays to de-energize.
4. If the leak detector has a service switch, slide it to the "SERVICE" position. This step deactivates the Early Warning, Alarm, and Auxiliary relays so that any attached strobe lights, horns, and/or monitoring systems are not activated. In some applications, if alarming is required, leave the service switch in the "NORMAL" position.
5. Place a **new** ammonia test bottle over the sensor and after 30-45 seconds (slightly longer in coolers & freezers) the top LED lamp (large lamp) shall light up. Also, the Alarm and Auxiliary relays shall de-energize at this time. Remember, during the calibration procedure, the Early Warning LED lamp (amber lamp) will light up, and the Early Warning relay shall de-energize. This is a **factory set, non-adjustable setting**.
6. To fine tune the Alarm setpoint, adjust the POT2 potentiometer (large potentiometer) until the Alarm LED lamp just lights up and

**AVAILABLE OPTIONS**

In addition to the standard features, the LBW-50 can be equipped with these options:

- A remote ammonia sensor with cable allowing the sensor to be located a maximum of 500 feet away from the detector.



- An internal back-up battery to keep the detector working during loss of main power.
- A stainless-steel washdown tube installed over the sensor to minimize the chance of getting wet during washdown.
- A remote alarm light and horn box with a toggle switch to TEST/NORMAL/SILENCE the alarm.



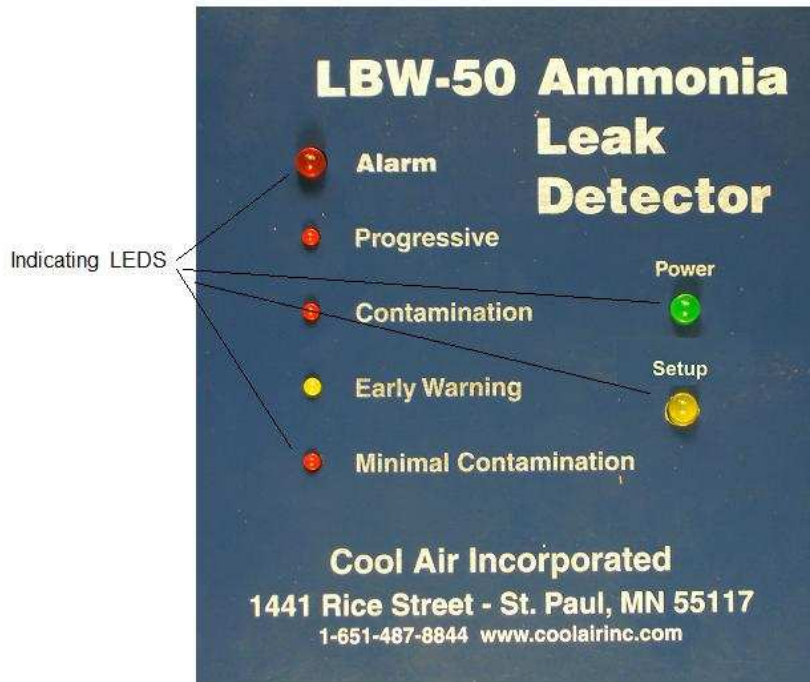
Contact Cool Air Incorporated technical support for more detailed information, or for purchasing, any of these options.

## PARTS DESCRIPTION

### Front Panel Display

The front panel display is comprised of a series of labeled indicating LED's. The LED's provide an indication of ammonia concentration, alarm status, power supply, and service mode at a glance.

#### Front Panel Display



For information on how the display indicates ammonia concentrations, see the sections on ammonia leak indication

## TESTING AND CALIBRATION

### FIELD TESTING (ONCE A MONTH):

We recommend **testing not calibrating** your ammonia leak detector **once every month** using the supplied ammonia test bottle. For your convenience, there are numbers to check off on the ammonia test bottle for each month of testing. After one year, purchase a new ammonia test bottle, follow the calibration procedure below, and then use the same bottle for testing your ammonia leak detector throughout the year.

To test the detector, follow these steps:



**WARNING: RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER TO QUALIFIED SERVICE PERSONNEL.**

**AVIS: RISQUE DE CHOC ELECTRIQUE. NE PAS ENLEVER LE COUVERCLE. AUCUN ENTRETIEN DE PIECES INTERIEURES PAR L'USAGER. CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE.**

1. Open the detector enclosure and slide the service switch to the "SERVICE" position, if needed. This step deactivates the Early Warning, Alarm, and Auxiliary relays so that any attached strobe lights, horns, and/or monitoring systems are not activated. In some applications, if alarming is required, leave the service switch in the "NORMAL" position.
2. Hold a sample bottle of ammonia of concentration over the sensor.
3. Check the following:
  - LEDs on the front display panel light up from the bottom to the top.
4. Remove the ammonia sample.

**Wait until the ammonia concentration reading is below the pre-alarm set point**, then slide the service switch to the "NORMAL" position and close the detector enclosure. Remember, this step is only required if the service switch was turned to the "SERVICE" position in step # 1 above. Testing is now complete.



## Ammonia Leak Indication

In the event of a higher-than-normal ammonia concentration, the front-panel LEDs will indicate as follows:

| <b>If the Ammonia Concentration...</b>              | <b>Then the...</b>                     | <b>And...</b>                       |
|---|--|-------------------------------------|
| Equals or exceeds 25 PPM                            | Red "Minimal Concentration" LED lights | No other actions occur              |
| Equals or exceeds the pre-alarm set point           | Yellow "Early Warning" LED lights      | The pre-alarm relay trips           |
| Continues to increase above the pre-alarm set point | First red "Progressive" LED lights     | No other actions occur              |
| Equals or exceeds the alarm set point               | Red "Alarm" LED flashes                | The alarm and auxiliary relays trip |

After an alarm, the alarm and auxiliary relays will automatically reset when the ammonia concentration falls below the alarm set point, and the pre-alarm relay will automatically reset when the ammonia concentration falls below the pre-alarm set point.

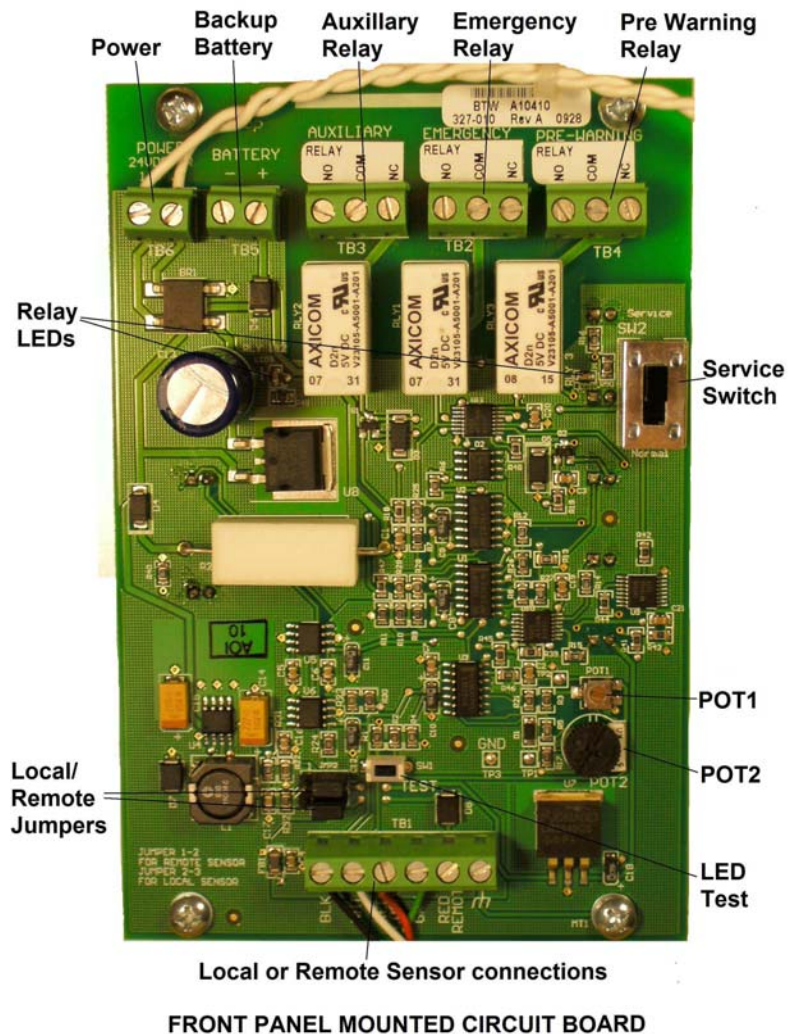
## Ammonia Sensor

The detector comes with a solid-state, long-life sensor that has a high sensitivity to amine compounds and a quick response to concentrations of ammonia. The sensor is protected by a flame arrestor, and has an integral heater and a ceramic base that is resistant to severe environments.

If a new ammonia sensor is installed, the detector must be re-calibrated. See the "TESTING AND CALIBRATION" section starting on pages 24-25.

## Front Panel-Mounted Circuit Board

The front panel-mounted circuit board (see picture on page 9) contains the controls necessary for adjusting and operating the detector. Each control is described in detail in the following pages. When the detector enclosure is open, this circuit board is on the left, attached to the front panel.



### Backup Battery Testing, Installation and Replacement

The LBW50 can be supplied with an optional Backup Battery from Cool Air Incorporated. This backup supply is good for approximately 1 ½ hours of operating time. During normal operation, the backup battery is not used but is kept trickle charged. In the event of a power failure, the unit will seamlessly operate off of the back-up battery.



**WARNING: RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER TO QUALIFIED SERVICE PERSONNEL.**

**AVIS: RISQUE DE CHOC ELECTRIQUE. NE PAS ENLEVER LE COUVERCLE. AUCUN ENTRETIEN DE PIECES INTERIEURES PAR L'USAGER. CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE.**

To test an existing or new battery installation, simply disconnect the leak detector power supply. The unit should stay in normal operation and not turn off. If the unit turns off, check to make sure that the red and black wires are secure on the battery terminals and the circuit board terminals. If the wiring is good, the battery should be replaced.

If the back-up battery needs to be replaced because it has either failed, or will not keep a charge, a new back-up battery can be ordered through your local leak detector supplier or directly from Cool Air Incorporated. Prior to removing the old battery, disconnect the leak detector power supply, remove the black and red wires from the battery terminals, cut the wire cable strap (used primarily for shipping), and remove the battery from the Velcro mounting pad. Install the new battery onto the Velcro mount pad, remove the battery protector caps, plug the black wire into the black terminal, plug the red wire to the red terminal, and reconnect the leak detector power supply. Allow 24-hours of leak detector operation time before testing the new battery.

### Service Switch (Service Mode)

The detector can be set to one of two modes: normal operating mode or service mode. The detector is in normal operating mode when the service

**Remote Alarm Installation**

Remote Alarm allows for an audible and visible alarm of the LBW-50 at a local or remote location.



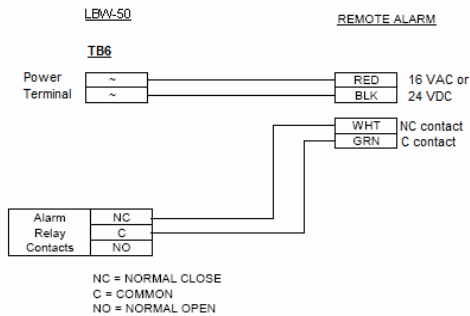
**WARNING: RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER TO QUALIFIED SERVICE PERSONNEL.**

**AVIS: RISQUE DE CHOC ELECTRIQUE. NE PAS ENLEVER LE COUVERCLE. AUCUN ENTRETIEN DE PIECES INTERIEURES PAR L'USAGER. CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE.**

The wiring diagram below shows the connections from the LBW-50 to the Remote Alarm. Power for the Remote Alarm is derived from the 16 VAC or 24 VDC 'Power' terminal strip on the LBW-50 Front Panel Circuit Board. An Alarm signal is derived from the LBW-50 enclosure-mounted circuit board.

The Remote Alarm device is pictured next to the wiring diagram.

**LBW-50 to Remote Alarm Wiring**



switch is in the "Normal" position. When the service switch is in the "Service" position, the detector continues to function as usual, however the alarm, pre-alarm, and auxiliary relays are disabled. This allows the detector to be serviced, tested, and calibrated without tripping the alarm relays and setting off the alarms.

When the detector is in the service mode, the "Service" LED on the front panel flashes yellow. After 30 minutes in service mode, the "Minimal Contamination" and "Early Warning" LEDs will also be lit. This is done as a reminder to set the service switch back to the "Normal" mode.

**Adjustment Alarm Potentiometer**

There is one adjustment potentiometer that is provided to set the Alarm setpoint. The Pre-Alarm (Early Warning) is adjusted at the factory and 'locked' into place. The Alarm setpoint is also pre-set at the factory but is field adjustable. The adjustment procedure is in the "INSTALLATION AND SET-UP" section, on page 17.

**LED Test Button**

Pressing the momentary LED Test button will cause all LED's to light to up and all three relays to de-energize to confirm that they are functional.

**Local/Remote Jumpers**

JMPR1 and JMPR2 convert from a local (enclosure mounted) sensor to a remote sensor. For a local sensor, both jumpers must connect pins 1 to 2, the far right position when viewed as shown in the picture on page 10. For a remote sensor, both jumpers must connect pins 2 to 3, the far left position when viewed as shown in the picture on page 10.

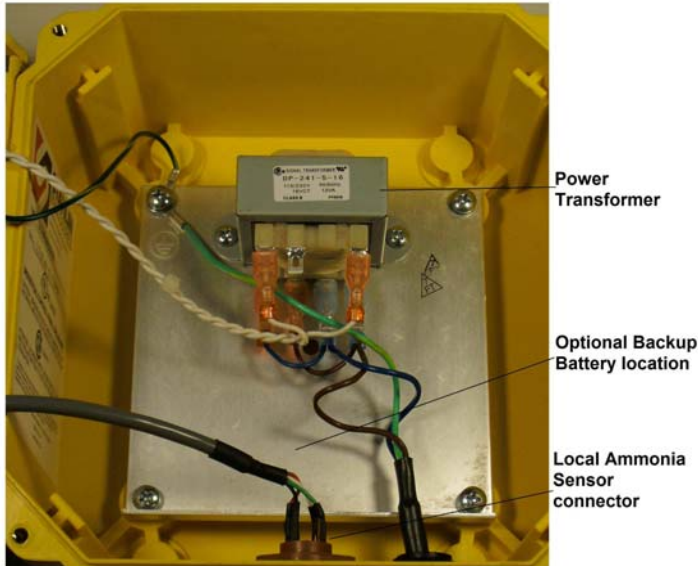
**Relay LED's**

Two green LED's indicate that the relays are energized. LED9, to the left of the relays, indicates that Alarm and Auxiliary relays are energized. LED 10, to the right of the relays indicates that the Pre-Warning relay is energized.

### Enclosure-Mounted Components

The enclosure-mounted components include a transformer for 115/230 VAC, 50/60 Hz operation. An optional back-up battery can be installed in the location shown and wired to the front-panel circuit board 'Battery' terminal.

LBW-50 ENCLOSURE MOUNTED COMPONENTS



### Remote Sensing

Remote Sensing allows the ammonia sensor to be located remotely from the LBW-50. Remember, there is only one sensor per leak detector.



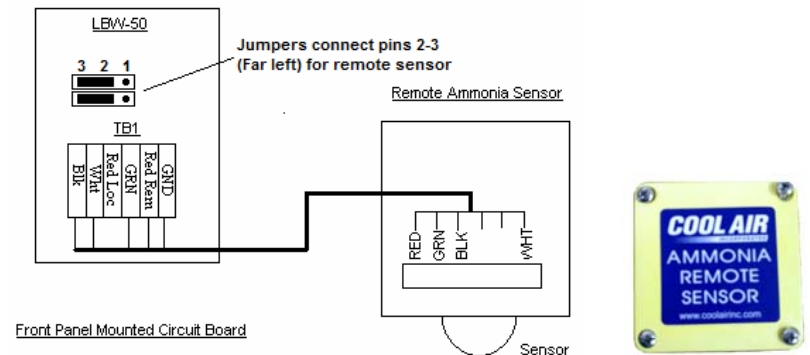
**WARNING: RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER TO QUALIFIED SERVICE PERSONNEL.**

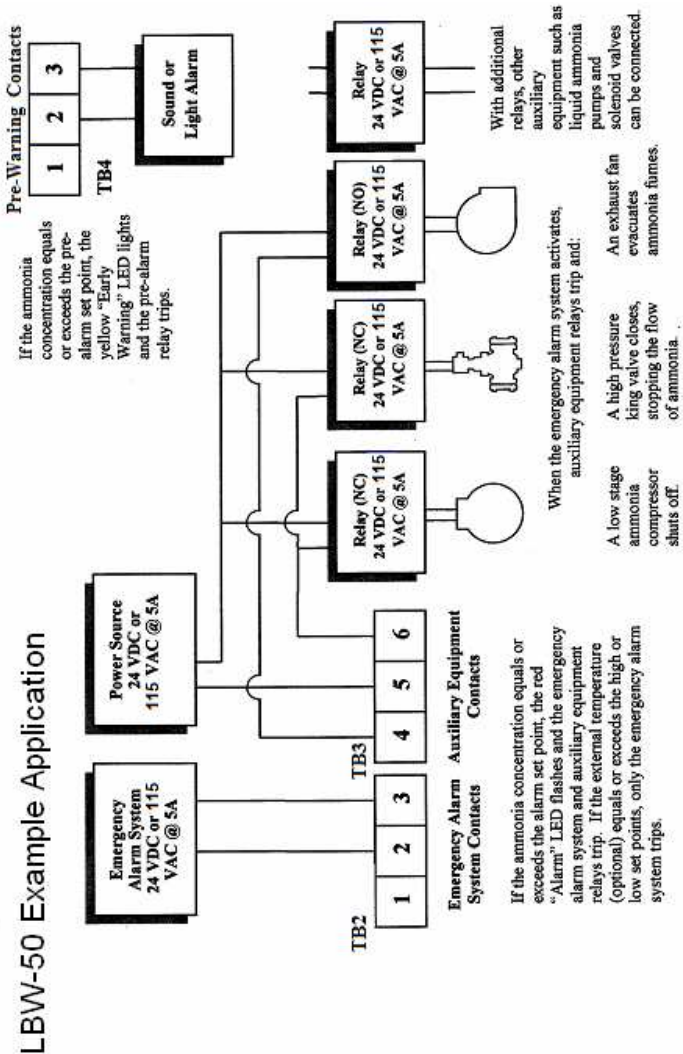
**AVIS: RISQUE DE CHOC ELECTRIQUE. NE PAS ENLEVER LE COUVERCLE. AUCUN ENTRETIEN DE PIECES INTERIEURES PAR L'USAGER. CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE.**

The wiring diagram below shows the connections from the LBW-50 to the Remote Sensor. All connections to the Remote Sensor are made at the LBW-50 terminal strip on the Front Panel Circuit Board using 4 conductor shielded cable. Note specifically that the RED WIRE CONNECTS TO THE REM TERMINAL AND DOES NOT CONNECT TO THE 'RED' TERMINAL. Also, the shield and or drain conductor connects to the SHIELD terminal on the LBW-50 only (do not connect in the Remote Sensor).

The Remote Sensor device is pictured next to the wiring diagram.

LBW-50 to Remote Sensor Wiring





### Power Supply



**WARNING: RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER TO QUALIFIED SERVICE PERSONNEL.**

**AVIS: RISQUE DE CHOC ELECTRIQUE. NE PAS ENLEVER LE COUVERCLE. AUCUN ENTRETIEN DE PIECES INTERIEURES PAR L'USAGER. CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE.**

Power for the LBW-50 must be a nominal 115 or 230 Volts AC, 50/60 Hz, 16 VAC, or 24 VDC. The 115/230 VAC power is connected to the transformer mounted on the back panel of the enclosure. The 16 VAC or 24 VDC power is connected directly to the "Power" terminals on the upper left-hand corner of the front panel mounted circuit board. A safety ground terminal is also provided on terminal block J2.

### Relays

The detector has three miniature printed circuit board relays: the Alarm, Pre-Alarm (Early Warning), and the Auxiliary relays. The Auxiliary relay operates at the same time as the Alarm relay. In the normal operating mode, the relays are energized in a normally-open state. If a loss of power to the detector occurs, the relays will de-energize and the alarms, if connected, will activate.

### Relay Status LED's

Each relay has a surface-mounted LED associated with it that indicates the status of the relay. A relay is energized (a non-alarm condition) when its LED is lighted (green), and de-energized (an alarm condition) when the LED is not lit.



## External Connections

Contacts for external connections:

- Auxiliary Relay contacts
- Alarm Relay contacts
- Pre-Alarm (Early Warning) Relay contacts

## Wiring Diagram: LBW-50

Installation wiring diagrams for the LBW-50 are shown on the next three pages. The 115 VAC diagram is on page 14, the 230 VAC diagram is on page 15, and the 16 VAC or 24 VDC diagram is on page 16.

The detector is tested, adjusted, and calibrated at the factory. To field adjust the Alarm setpoint of the detector for a specific installation, follow the steps below.



**WARNING: RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER TO QUALIFIED SERVICE PERSONNEL.**

**AVIS: RISQUE DE CHOC ELECTRIQUE. NE PAS ENLEVER LE COUVERCLE. AUCUN ENTRETIEN DE PIECES INTERIEURES PAR L'USAGER. CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE.**

1. Open the detector enclosure and place the detector in service mode by sliding the service switch to the "Service" position.
2. Apply power to the detector and allow the sensor to warm up to normal operating temperature (at normal operating temperature, all LEDs will be unlit).
3. Hold the desired ammonia test bottle over the sensor head.
4. Adjust the Alarm set point by adjusting the potentiometer labeled 'POT2' clockwise to increase the sensitivity and counter-clockwise to decrease the sensitivity.
5. Slide the service switch back to the 'Normal' setting.
6. For testing and calibrating the leak detector, see the "TESTING & CALIBRATION" section on page 24-25.

## LBW-50 Example Application

This schematic on the next page illustrates an example application.

## INSTALLATION AND SETUP

**Caution: Do not apply power to the detector until instructed to do so.**

The detector comes with four mounting feet, packaged in the detector enclosure for shipment. Use the directions that accompany the mounting feet for mounting the detector enclosure.

The detector should be mounted in a location where ammonia leaks are most likely to occur, such as near valve groups, compressors, and refrigeration coils. Be sure the detector is visible and easily accessible. Avoid locating the detector where it might be damaged by forklift traffic and/or any other types of external activity. In washdown areas, please make sure the sensor is protected from washdown by installing our optional stainless-steel washdown tube. It is important not to install the detector (specifically the sensor) in designated smoking areas, as even a minute concentration of smoke will set off the alarm.

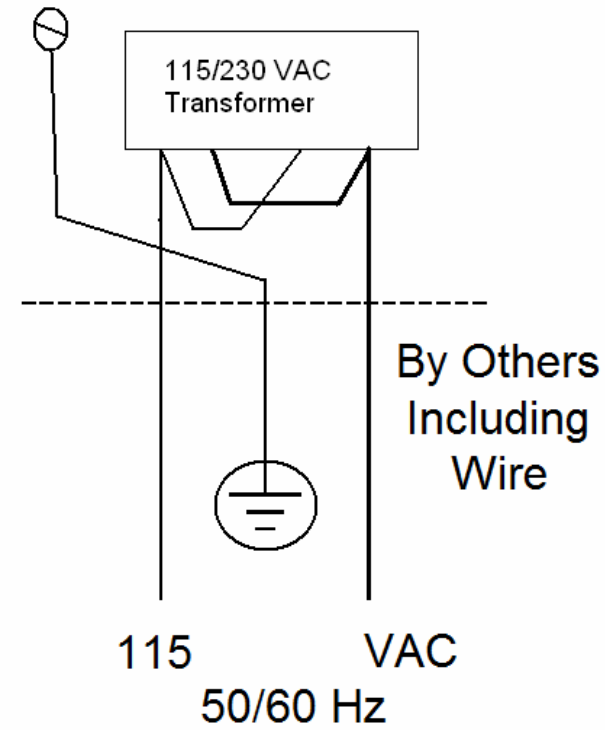


**WARNING: RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER TO QUALIFIED SERVICE PERSONNEL.**

**AVIS: RISQUE DE CHOC ELECTRIQUE. NE PAS ENLEVER LE COUVERCLE. AUCUN ENTRETIEN DE PIECES INTERIEURES PAR L'USAGER. CONFIER L'ENTRETIEN AU PERSONNEL QUALIFIE.**

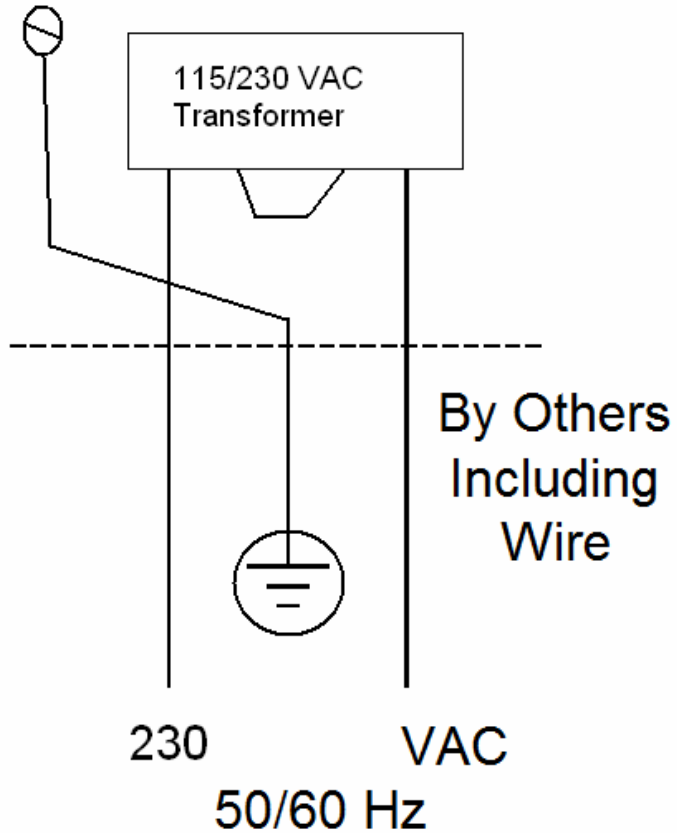
The detector is set at the factory to operate on 115 VAC. When power is first applied to the detector in the field, it will immediately go into Alarm status and the LED's will indicate a large ammonia concentration. This is normal. When the sensor warms to normal operating temperature (usually about a minute) the detector will return to a non-alarm status. **For this reason, the detector must be placed in service mode before applying power to the detector to avoid nuisance alarms.** Once the LED's are no longer lit up, set the service switch back into the normal mode.

## LBW-50



## Typical 115 VAC Application

### LBW-50



Typical 230 VAC Application

### LBW-50

