

# **COOL AIR**

**INCORPORATED**



## **LBW-50 Ammonia Leak Detector**

**LBW-50-SS (solid state sensor)  
LBW-50-EC (electrochemical sensor)**

## **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.

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## **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 or purchase an ABS washdown tube to protect the detector sensor during washdown and avoid spraying the washdown liquid directly onto the sensor.

## **INTRODUCTION**

The Cool Air Incorporated LBW-50 is an AC/DC powered state-of-the-art ammonia leak detector that detects and indicates 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.

Optionally available with an electrochemical sensor that is highly selective to ammonia.

Outputs are three dry contact relays.

## **STANDARD FEATURES**

The LBW-50 comes with these additional standard features:

- Adjustable Alarm set point...
- 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.

## 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.



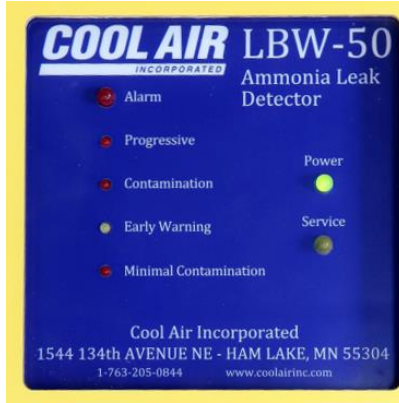
- An internal back-up battery to keep the detector working during loss of main power.
- An ABS washdown tube installed over the sensor to minimize the chance of getting wet during washdown.
- LBW-50 with Relief Line Sensor



## 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.



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

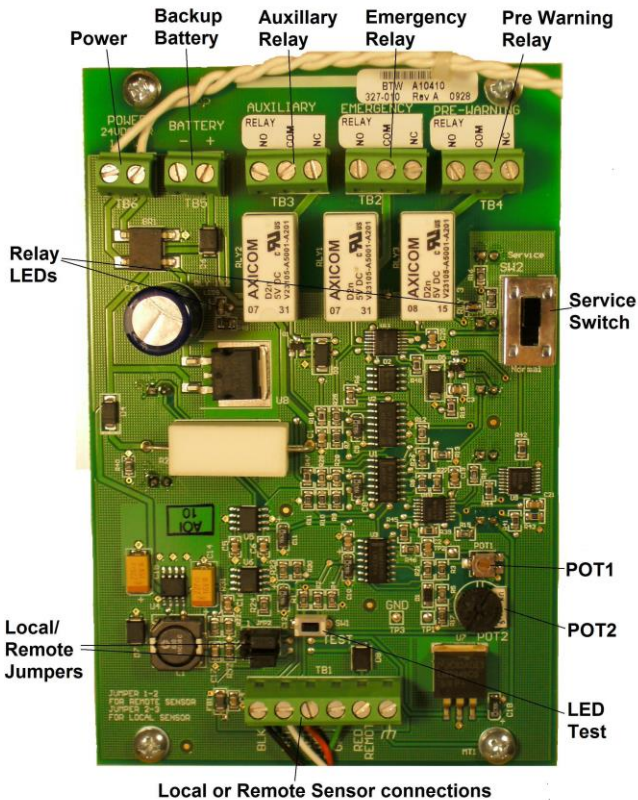
### Ammonia Sensor

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 21-23.

## Front Panel-Mounted Circuit Board

The front panel-mounted circuit board 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.



FRONT PANEL MOUNTED CIRCUIT BOARD



## **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 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.

## **Adjustable Alarm Potentiometer**

There is one adjustment potentiometer that is provided to set the Alarm set point. The Pre-Alarm (Early Warning) is adjusted at the factory and ‘locked’ into place. The Alarm set point is also pre-set at the factory but is field adjustable. The adjustment procedure is in the “INSTALLATION AND SET-UP” section, on page 16.

## **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 2 to 3, the far-right position when viewed as shown in the picture on page 8. For a remote sensor, both jumpers must connect pins 1 to 2, the far-left position when viewed as shown in the picture on page 7.

## Relay LED's

Two green LED's (see page 7) indicate that the relays are energized. LED 9, 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 AC to DC converter for 100 to 240 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.



## Power Supply



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Power for the LBW-50 must be a nominal 100 to 240 Volts AC, 50/60 Hz, 16 VAC, or 24 VDC. The 100 to 240 Volts AC power is connected to the AC to DC converter 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 the back panel.

## **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.

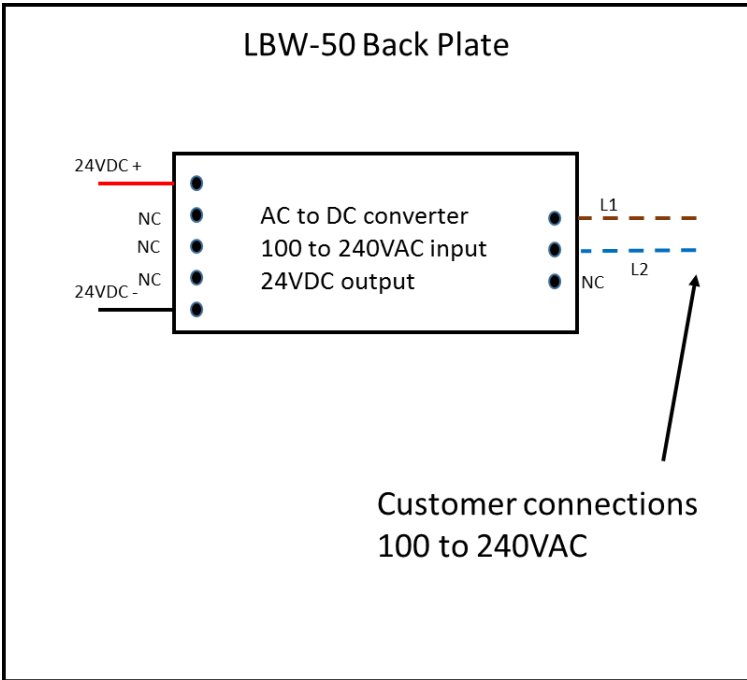
## **External Connections**

Contacts for external connections:

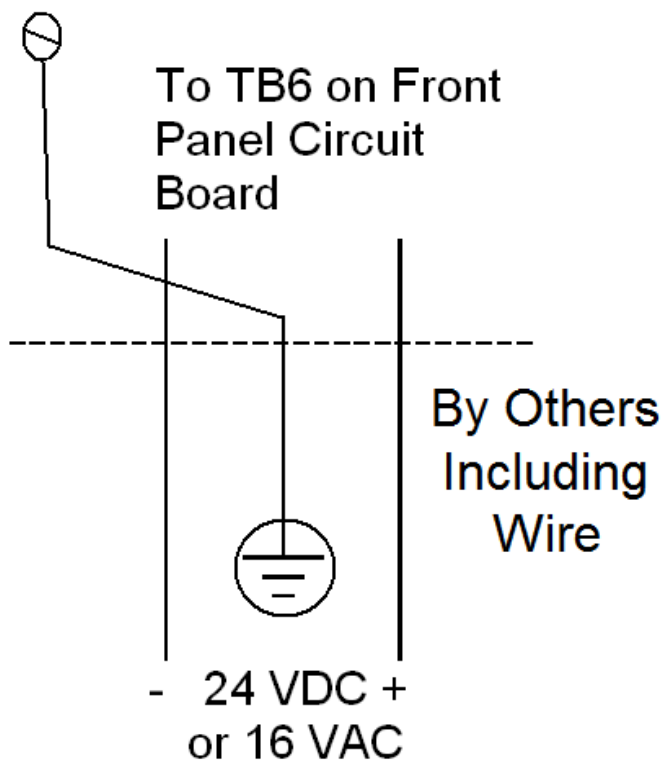
- Auxiliary Relay contacts
- Alarm Relay contacts
- Pre-Alarm (Early Warning) Relay contacts

## Wiring Diagram: LBW-50

Installation wiring diagrams for the LBW-50. The 100 to 240 VAC diagram is shown below, and the 24 VAC or 24 VDC diagram is on page 12.



## LBW-50



Typical 24 VDC or 16 VAC 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 ABS wash-down 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.

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.

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

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.

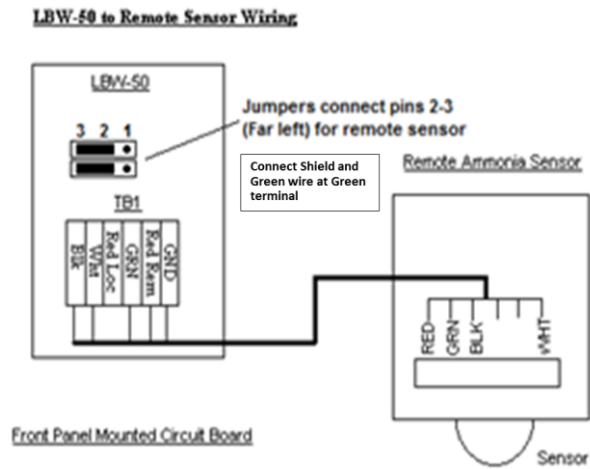
4. Adjust the Alarm set point by adjusting the potentiometer labeled 'POT2' clockwise to increase the sensitivity and counter-clockwise to decrease the sensitivity.
5. Slide the service switch back to the 'Normal' setting.
6. For testing and calibrating the leak detector, see the "TESTING & CALIBRATION" section on page 19-22.

## 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.

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 RED REM TERMINAL AND DOES NOT CONNECT TO THE 'RED' TERMINAL. Also, the shield and or drain conductor connects to the GRN terminal along with the Green wire on the LBW-50 only (do not connect in the Remote Sensor).

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





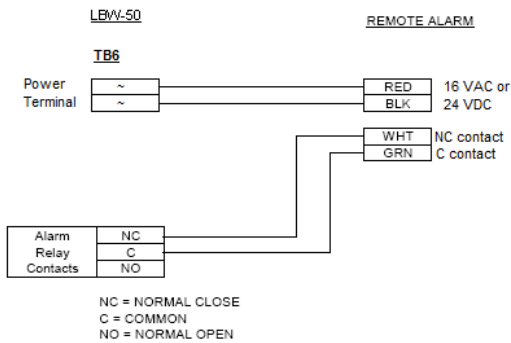
## Remote Alarm Installation

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

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



## 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 from the back-up battery.

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.

### Ammonia Leak Indication

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

▼ INCREASING ▼ CONCENTRATION ▼

<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.

## TESTING AND CALIBRATION (with solid state sensor)

It is recommended the detector(s) be tested at least once a month in critical areas and once a quarter in non-critical areas to ensure they are operating correctly. Also, the detector must be calibrated at least once a year to ensure it is detecting and displaying ammonia concentration accurately. At the time of calibration, you must use a new test bottle of ammonia that can be purchased from Cool Air Inc. or their distributors. If a new ammonia sensor is installed, the detector must be recalibrated. All tests and calibrations must be documented.

### TESTING:

To test the detector, follow these steps:

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.

## CALIBRATION:

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.**
3. Slide the service switch 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.
4. 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. 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**.
5. To fine tune the Alarm set point, adjust the POT2 potentiometer (large potentiometer) until the Alarm LED lamp just lights up and 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.
6. 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.
7. We recommend this calibration to be performed once a year or whenever the sensor has been replaced. Use a **new** ammonia test bottle. These can be purchased from your local Cool Air Incorporated distributor or directly from the manufacturer.

## **TESTING AND CALIBRATION (with electrochemical sensor)**

It is recommended the detector(s) be tested at least once a month in critical areas and once a quarter in non-critical areas to ensure they are operating correctly. Also, the detector must be calibrated at least once a year to ensure it is detecting and displaying ammonia concentration accurately. At the time of calibration, you must use a new test gas bottle of ammonia that can be purchased from Cool Air Inc. or their distributors. If a new ammonia sensor is installed, the detector must be recalibrated. All tests and calibrations must be documented.

### **TESTING:**

To test the detector, follow these steps:

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. Using precision Cal Gas of known ammonia concentration present the gas to the sensor at .3LPM for two minutes. 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.
3. Check the following:
  - a. LEDs on the front display panel light up from the bottom to the top.
4. Remove the ammonia sample.
5. Wait until the ammonia concentration reading is below the pre- Alarm set point, 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.

## CALIBRATION:

8. Visually inspect the leak detector for any corrosion, damage, etc. that could possibly affect the calibration procedure.
9. **Make sure that the leak detector is powered up for a minimum of 20 minutes before the calibration procedure is performed.**
10. Slide the service switch 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.
11. Using precision Cal Gas of known ammonia concentration present the gas to the sensor at .3LPM for two minutes. 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.
12. To fine tune the Alarm set point, adjust the POT2 potentiometer (large potentiometer) until the Alarm LED lamp just lights up and 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.
13. Wait until the ammonia concentration reading is below the pre- Alarm set point, 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.
14. We recommend this calibration to be performed once a year or whenever the sensor has been replaced. Use a new ammonia Cal gas bottle. These can be purchased from your local Cool Air Incorporated distributor or directly from the Cool Air Incorporated.

## **TECHNICAL SUPPORT**

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

Contact: Sales@coolinc.com

Phone: (763) 205-0844 (USA)

Fax: (763) 432-9295 (USA)

E-mail: sales@coolairinc.com

Web site: www.coolairinc.com

Address: Cool Air Incorporated  
1544 134<sup>th</sup> Ave NE 134th Avenue NE  
Ham Lake Ham Lake, MN 55304 55304  
USA

## **WARRANTY**

The LBW-50 comes with a 36-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 IN CRITICAL AREAS, QUARTERLY IN NON\_CRITICAL AREAS 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.**



## LBW-50 SPECIFICATIONS

Ammonia Detection Sensitivity	25 to 800 PPM
Ammonia Sensor	Metal oxide semiconductor 833 mW integral heater Alumina ceramic base 100 mesh SUS 316 double gauge flame arrestor
Relays	Alarm, Pre-Alarm, and Auxiliary (auxiliary relay operates at same time as alarm relay) Form C (SPDT), normally-open, normally-closed, energized in normally-open state. 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	100 to 240VAC 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

## LBW-50 SPECIFICATIONS (cont'd)

Pollution Degree	1
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. ABS washdown tube</li><li>4. Remote alarm light and horn unit with box, cable, &amp; TEST/NORMAL/SILENCE toggle switch.</li></ol>

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