

COOL AIR

(763) 205-0844

INCORPORATED

Ammonia Leak Detection Systems



Models

0 to 10% Vent Line SENSOR ONLY

LBW-420-RLV-% 24VDC (optional 100 to 240VAC)

FIRMWARE 12

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SPECIFICATIONS

Ammonia Detection Sensitivity	.1 to 10%
Display	0.8", 7-segment LED, 2-digit
Controls	Service mode jumper Enter, Up, and Down pushbuttons Rotary selector switch Jumper
Ammonia Sensor – Catalytic Bead	* Selectivity to NH ₃ * Linear output * Long life * Stable baseline
Relays	Alarm, pre-alarm, and auxiliary (see pairing aux relay) Form C (SPDT), fail safe Contact rating: 5A, 120 VAC or 24 VDC
Outputs	Contacts for: alarm, pre-alarm, and auxiliary relays, and external temperature sensor 4-20 mA DC, conforming to S50.01 ratings, Type 2L and Type 2H
Operating Temperature	-40°F to 130°F
Operating Humidity	5% to 80% RH, non-condensing
Power Requirements	LBW-420-REL-V-% 24Volts DC; 21.6 – 26.4, +/- 10% 0.5 Amps max.
Dimensions	9½" H x 8" W x 4½" D
Weight	6 lbs.
Enclosure	NEMA 4X rated, UL listed
Pollution Degree	1

IMPORTANT—READ THIS FIRST

**PLEASE READ AND UNDERSTAND THIS SECTION
BEFORE INSTALLING AND OPERATING THE LBW-
420 DETECTOR.**

CAUTION:



**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.**

After applying power, test the detector to ensure it is operating correctly. Be sure the detector has been powered for at least 20 minutes before testing.

**Do not store this manual inside the detector, as this
might result in damage to components from excessive
heat.**

INTRODUCTION

The Cool Air Incorporated LBW-420-RLV-% Detector is a state-of-the-art ammonia leak detector that detects and displays ammonia concentrations of .1 to 9.9%. It comes equipped with a long-life ammonia sensor that has a quick and accurate response to ammonia concentrations.

The Cool Air Incorporated LBW-420-RLV-% has a fully isolated DC to DC power supply, allowing the LBW-420-RLV-% to be

powered from the same DC supply as the 4-20 mA monitoring circuits without concern for ground isolation.

The LBW-420-RLV-% requires a DC supply voltage between 18 and 36 volts.

The LBW-420-RLV-% can be configured to supply power to the 4-20 mA circuit(s) or can operate as a fully isolated 4-20 mA sensor. Refer to **4–20 mA Analog Outputs** for more details.

The Cool Air Incorporated LBW-420-RLV-% can be optionally equipped with an AC to DC converter to allow operating the detector with 100 to 240VAC input.

STANDARD FEATURES

All LBW-420's come with these additional standard features:

- Programmable Hi Alarm and Low-Alarm set points
- Selectable Service Mode timeout
- 4-20 mA analog output signals, for ammonia which can communicate directly with computer systems such as PLC's
- Normally-open, normally-closed contacts for communicating with common industry alarm systems, operating auxiliary equipment such as exhaust fans, king valves, compressors, and additional alarm systems.
- A NEMA 4X, UL-listed enclosure.
- Auxiliary contacts for can be set to operate as an indication of an error only, error and active with low alarm relay or error and active with alarm relay.

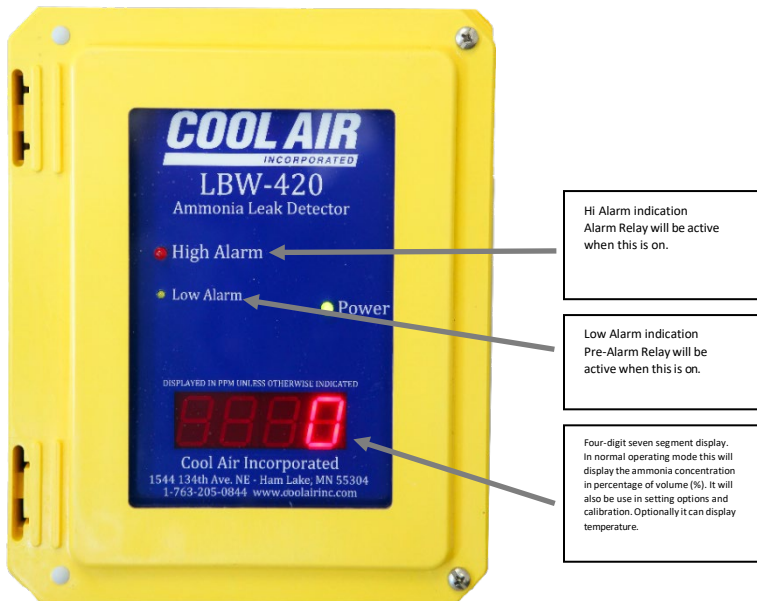
The LBW-420-RLV-% is only available with remote sensing;

- LBW-RL-RS-50-% - % RLV Remote sensor with 50' cable
- LBW-RL-RS-100-% - % RLV Remote sensor with 100' cable
- LBW-RL-RS-% - LBW-420/50 % RLV Remote sensor no Cable
- LBW-LT-RL-RS-5-% - LBW-50 or 420 % relief line remote sensor with 5 ft. of Liquidtite conduit

PARTS DESCRIPTION

Front Panel Display

The front panel display is comprised of a digital display and a series of labeled indicating LED's. The seven-segment, four-digit display indicates a variety of information, such as ammonia concentration and external temperature (if an external temperature sensor is in use), and more, depending on the position of the rotary selector switch. Ammonia concentration is displayed in percentage. The LEDs provide an indication of alarm status at a glance.



Ammonia Sensor

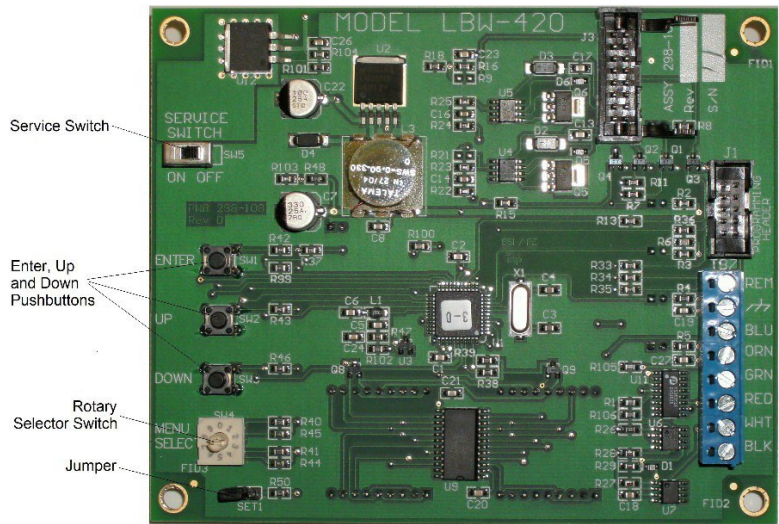
The detector comes with a Catalytic Bead, long-life sensor that has a good selectivity and a quick response to high concentrations of ammonia. The sensor is temperature compensated and is protected by an inexpensive pre-filter that is easy to replace.

Front Panel-Mounted Circuit Board

The front panel-mounted circuit board contains the controls necessary for programming and operating the detector. Each control is described in detail below. When the detector enclosure is open, this circuit board is on the left, attached to the front panel.

NOTE: The service switch may be a jumper instead of the switch.

LBW-420 and LBW-420-1 Ammonia Leak Detectors



Front Panel-Mounted Circuit Board

Service Jumper (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 jumper is in the “OFF” position. When the service jumper is in the “ON” position, the detector continues to function as usual, however the alarm, pre-alarm, and auxiliary relays are disabled as well as the 4 to 20mA signal is set to 4ma (0%). This allows the detector to be serviced, tested, and calibrated without tripping the alarm relays and setting off alarms.

When the detector is in the service mode, the display will alternate between the sensor reading in % and “SE” (service jumper “on”, Switch position 0 or 1). This is done as a reminder to set the jumper back to “off” when service is done. If the service jumper is not returned to off, it will automatically return to an as off state after a selected amount of time. The factory default is 8 Hours.

See “Setting the Service Mode Timeout”

The “ENTER”, “UP”, and “DOWN” Pushbuttons

The “UP” and “DOWN” buttons are used for setting the digital display to the desired value, and the “ENTER” button is used for programming a value previously set on the digital display. These buttons are used when programming: the set points, the external temperature sensor installation status, they are also used during calibration of the detector.

Rotary Selector Switch

The rotary selector switch (labeled “MENU SELECT” on the front panel-mounted circuit board) is used for performing functions such as:

- Setting the information displayed on the front panel
- Programming set points
- Displaying system information
- Calibrating the detector

When the detector is in operation, this switch is typically set to position “0” to continuously display ammonia concentration. Use the following chart to select the switch position for the desired function:

To:	Set the Rotary Selector Switch to:
Display ammonia concentration in %	0
Display ammonia concentration in %	1
Display the firmware revision	2
Program the ammonia High alarm set point	3
Program the ammonia Low alarm set point	4
Display ammonia concentration in % (See Section Testing the Detector)	5
Auxiliary Relay latching Yes/No	6
Pre-Alarm (low alarm) Relay latching Yes/NO	7
Alarm Relay (High Alarm) Latching Yes/No	8
Factory Use	9

Note: If the rotary selector switch is left in a position other than “0” or “1” and/or the “SET1” jumper is left on for more than 5 minutes without pressing an “UP” or “DOWN” button, the digital display will begin to display ammonia concentration. If this happens, return the selector switch to the “0” position and remove the “SET1” jumper, then set the switch to the desired position. For example, if you set the rotary selector switch to position “3” to program the alarm set point, and if, after 5 minutes of inactivity the display reverts to displaying ammonia concentration, move the switch to “0”, then back to “3” to continue programming the alarm set point.

Caution: Before closing the detector enclosure, be sure to return the rotary selector switch to position “0” or “1” to correctly display ammonia concentration.

Additional functions are available through the rotary selector switch when the jumper (labeled “SET1”), located below the rotary selector switch on the front panel-mounted circuit board, is installed:

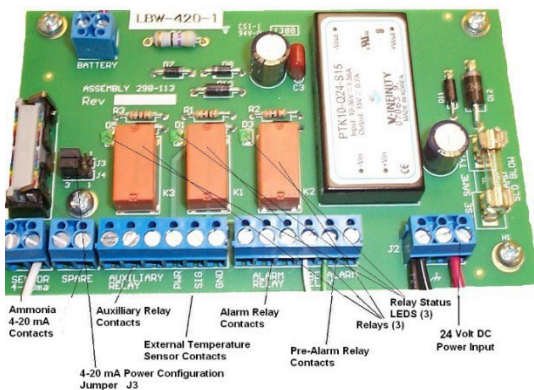
To:	Set the Rotary Selector Switch to:
“- “Future use	1
Display the firmware revision	2
Program the ammonia sensor 4 – 20mA Range	3
Set the Service Mode Time out	4
“- “Future use	5
Sets the AUX relay pairing	6
“- “Future use	7
Calibrate the detector fine adjust	8
Calibrate the detector course adjust	9

Note: If the rotary selector switch is left in a position other than “0” or “1” and/or the “SET1” jumper is left on for more than 5 minutes without pressing an “UP” or “DOWN” button, the digital display will begin to display ammonia concentration. If this happens, return the selector switch to the “0” position and remove the “SET1” jumper, then set the switch to the desired position. For example, if you set the rotary selector switch to position “3” to program the alarm set point, and if, after 5 minutes of inactivity the display reverts to displaying ammonia concentration, move the switch to “0”, then back to “3” to continue programming the alarm set point.

Enclosure-Mounted Circuit Board

The enclosure-mounted circuit boards differ between the LBW-420/-2 and the LBW-420-1 to accommodate the differing power connections. All other connections are identical. The Enclosure Mounted Circuit board contains the relays, output contacts and termination points for connecting to external equipment. When the detector enclosure is open, this circuit board is on the rear wall of the enclosure. The enclosure-mounted circuit board is shown in the following two pictures and described in detail below. **NOTE:** This detector does not support a 4 to 20mA output for the temperature sensor.

LBW-420-1 Enclosure Mounted Circuit Board



Power

Power for the LBW-420-RLV-% must be a DC voltage between 18 and 30 volts with a current rating of at least 0.5 amps at 24 volts. Power is connected to terminal block J2.

Jumper J3, Ammonia signal

Jumper J3 (ammonia signal) configures the LBW-420-RLV-% to use either an external power supply for the Ammonia 4-20 mA circuit or to use an on board 18 to 30-volt DC supply for the 4-20 mA circuits. With the jumper in the leftmost position, connecting

pins 2 to 3 (as shown in the picture on the next page) 4-20mA power is supplied by the on-board supply.

With the jumper in the rightmost position, connecting pins 2 to 1 (opposite of picture) 4-20 mA power must be supplied by an external supply.

Jumpers Required

Jumpers J3 must be installed in either position. If the jumper is removed, the 4-20 mA circuit(s) will not function.

Relays

The detector has three miniature printed circuit board relays: the alarm, pre-alarm (early warning), and the auxiliary relays. The auxiliary relay operates as selected. (See pairing the Aux Relay) The factory default is for the auxiliary relay to operate only when there is an “Err” (error) with the detector. 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 sound.

Relay Status LEDs

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 lighted.

External Connections

Contacts for external connections:

- 4–20 mA outputs for ammonia level
- Auxiliary Relay contacts
- External temperature sensor input (not available on this model)
- Alarm Relay contacts (Hi Alarm)
- Pre-alarm Relay contacts (Low alarm)
- DC Power

4–20 mA Analog Outputs

The detector has a 4-20 mA analog output that allows it to communicate with external devices such as computers, PLCs, and digital displays. The output conforms to ISA S50.01 ratings, Type 2L and Type 2H (two-wire).

The ammonia level detector output current (TB2, “Sensor 4-20mA” terminals on lower left of Enclosure Mounted Circuit Board) is proportional to ammonia % with the proportionality constant dependent on the range. The % value can be determined using one of the following formulae:

$\% \text{ NH}_3 = .041667 (I - 4)$	0 to 1% Range
$\% \text{ NH}_3 = .083334 (I - 4)$	0 to 2% Range
$\% \text{ NH}_3 = .416667 (I - 4)$	0 to 10% Range

Where % NH₃ equals ammonia concentration in percent and I equal the output current in mA. For example, if the current is 4 mA, then the ammonia concentration is 0 %. If the current is 20 mA, then the ammonia concentration is 1% (1% range), 2% (2% range), and 10% (10% range)

Wiring Diagram:

For this configuration, with the jumper J3 in the leftmost position (which connects pins 2 & 3) power for the 4-20 mA circuit is provided by the LBW-420-1. This circuit is shown below. The power supply must supply all power for the LBW-420-1 plus the 4-20 mA circuit. Refer to the specifications page for the power requirements for the LBW-420-1. The voltage drop across the detector and the receiver together must not exceed the power supply voltage. This circuit is shown in figure 2 below:

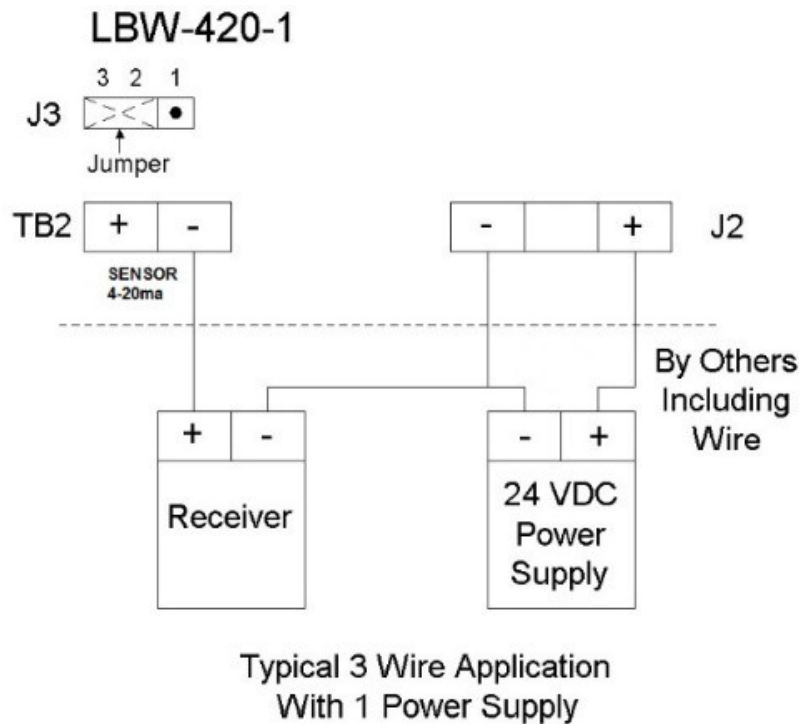
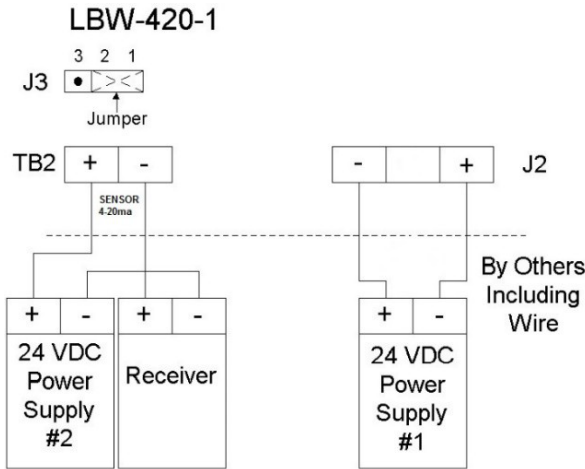


Fig 2

Wiring Diagram: With (2) – 24 VDC Power Supplies

In this configuration, with the jumper J3 in the rightmost position (which connects pins 1 & 2), power for the LBW-420-1 is supplied by the 24 VDC power supply #1 only. The power supply must supply all power for the LBW-420-1. Refer to the specifications page for the power requirements for the LBW-420-1. The power for the 4-20 mA circuit is supplied by the 24 VDC power supply #2. The 4-20 mA circuit is a simple series circuit that includes the LBW detector, a power supply, and the receiving device. It is recommended that a 24 VDC low-noise power supply be used for this application, although power supplies providing a minimum of 10 VDC to a maximum 30 VDC can be used. The voltage drop across the detector and the receiver together must not exceed the power supply voltage. This circuit is shown in Figure 3 below:



Typical 4 Wire Application
With 2 Power Supplies

Fig 3

The maximum allowable resistance in the receiving device must not exceed R_{max} using this formula:

$$R_{max} = 50 (V_s - 7.5)$$

Where V_s is the supply voltage in volts DC for the 4-20 mA circuit. For example, with a supply voltage of 24 VDC, the maximum allowable resistance is 825 Ω .

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.

Be sure the detector is visible and easily accessible. Avoid locating the detector where it might be damaged.

When power is applied to the detector, it may go into alarm status and the display will show an unusually 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 should be placed in service mode before applying power to the detector to avoid nuisance alarms.**

The detector is calibrated and programmed at the factory. To program the detector for its specific installation, follow these steps in the order given:

1. Open the detector enclosure and place the detector in service mode by moving the service jumper to the "ON" position.
2. Apply power to the detector and allow the sensor to warm to normal operating temperature (at normal operating temperature, the display will read "0" and all Alarm LEDs will be unlit).
3. Program the ammonia Low alarm and High alarm set points. See the next section on programming the ammonia Low alarm and high alarm set points.
4. Set the detector to the desired operating display mode (typically "0" or "1"). See the next section on setting the display mode.
5. Be sure the displayed ammonia concentration is below the programmed Low alarm set point. Return the detector to normal

operating mode by moving the service jumper to the “OFF” position.

6. Test the detector to ensure it is operating correctly (but allow at least 20 minutes after power is first applied to the detector before testing). See the section on testing the detector.

PROGRAMMING AND OPERATION

The LBW-420 detector is easy to program and operate. Follow the instructions in this section to:

- Program the ammonia alarm set points
- Set the 4 to 20mA range
- Set the Aux Relay pairing
- Set relays latching Yes / No

Programming the Ammonia Hi Alarm and Low Alarm Set Points

The Hi alarm set point can be set from .1% to 9.9% in .1% increments.

The High alarm set point cannot be lower than the Low alarm set point. When moving the High alarm set point lower it will stop decreasing when it equals the Low alarm set point.

The Low Alarm set point can be set from .1% to 9.9% in .1% increments.

The Low alarm set point cannot be higher than the High alarm set point. If when increasing the Low alarm set point it becomes equal to the High alarm set point, as you increase the low alarm set point it will also increase the High alarm set point to always maintain equal or lower set point.

1. Open the detector enclosure and move the service jumper to the “ON” position.
2. Set the rotary selector switch to position “3” to program the ammonia the Hi-Alarm set point (ALARM RELAY) or “4” to program the ammonia Low Alarm set point (PRE-ALARM RELAY).

3. Press the “UP” or “DOWN” button until the desired set point concentration in % is displayed.
4. Press and hold the “ENTER” button for at least 2 seconds. The new set point is now programmed.
5. Return the rotary selector switch to the desired position.
6. **Be sure the ammonia concentration reading is below the pre-alarm set point**, then move the service jumper to the “OFF” position and close the detector enclosure.

Programming the 4-20 mA range

The ammonia level 4-20 mA signal can be scaled to one of three ranges, either 0-1%, 0-2%, or 0-10%. The 0 to 1% range is the default setting.

To program the 4-20 mA range, follow these steps:

1. Open the detector enclosure and move the service jumper to the “ON” position.
2. Install the jumper on the jumper pins (labeled “SET1”) located below the rotary switch on the front panel-mounted circuit board.
3. Set the rotary selector switch to position “3”. The display will indicate the current range, either “r1” = 0 to 1%, “r2” = 0 to 2%, or “r3” 0 to 10%.
4. Press the “UP” or “DOWN” button until the display indicates the desired range.
5. Press and hold the “ENTER” button for at least 2 seconds. The new range is now programmed.
6. Remove the jumper and return the rotary selector switch to the desired position.
7. Move the service jumper to the “OFF” position and close the detector enclosure.

Setting the Service Mode Timeout

If the service jumper is not returned to off, you can change how long the detector stays in service mode before returning to normal operating mode.

With the SET 1 jumper on and the Rotary Switch in position 4 you can use the up and down buttons to select either;

- 1 – After 1 Hour in the on position the detector will return to normal mode.
- 2 – After 2 Hours in the on position the detector will return to normal mode.
- 4 – After 4 Hours in the on position the detector will return to normal mode.
- 8 – After 8 Hours in the on position the detector will return to normal mode.

Once you have selected the desired service mode timeout you must hold the ENTER button for two seconds before removing the SET 1 jumper or changing the rotary switch.

Setting the Auxiliary Relay Pairing

The auxiliary relay will always activate when there is an error (Err on the display). In addition, you can select to have the auxiliary relay paired (activate at the same time) as either the Hi Alarm (alarm relay) or the Low Alarm (pre-alarm relay).

With the SET jumper on and the Rotary Switch in position 6 you can use the up and down buttons to select either;

- AU – Auxiliary relay is not paired. Activates on errors only.
- AL – Auxiliary relay is paired with the Hi Alarm (alarm) relay.
- PR – Auxiliary relay is paired with the Low Alarm (pre-alarm) relay.

Once you have selected the desired service mode timeout you must hold the ENTER button for two seconds before removing the SET 1 jumper or changing the rotary switch.

Setting the relay latching

The Alarm (High Alarm) relay, Pre-Alarm (Low Alarm) relay, and AUX (Auxiliary) Relay can be set to latch “YE” or not latch “nO”

With the SET jumper off and the Rotary Switch in position **6** for AUX relay, **7** for Pre-Alarm relay, or **8** for Alarm Relay, you can use the up and down buttons to select either Latch “YE” or not latching “nO”

Once you have selected the desired latching mode you must hold the ENTER button for two seconds before removing the SET 1 jumper or changing the rotary switch.

Re-Setting a latched relay

Once the condition that caused the relay to latch has cleared, you can reset the latched relay by opening the cover and moving the “Service Mode Jumper” to the on position for 2 seconds then return the “Service Mode Jumper” to the off position.

Error Codes

In the event of a detector error, one of these error codes will be displayed on the front panel digital display. Possible causes are listed after the error description and are in order from most likely cause to least likely cause.

Error Code	Description
Err2	Loss of AC power occurs with battery backup or low ac input Defective Control display board (LBW-420-CDB) Defective Power Supply board (LBW-420-PSB-(Voltage))

Message Codes

If the service jumper is in the “on” position, the display message shows:

Message Code	Description
SER	Service jumper “on”

This is a reminder to move the service jumper to off, so the unit is in the normal operating mode. After the selected Service Mode Timeout, the detector will operate in as normal operation.

4-20 mA Error Indication

Any error condition will cause the ammonia level 4-20 mA signal to go to near zero indicating a fault.

TEST AND CALIBRATION

Be sure to follow all codes and company procedures that pertain to the maintenance, repair, testing, and calibration of all safety equipment, including this detector.

At a minimum, the detector must be tested after installation and once a quarter thereafter, to ensure it is 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, it is highly recommended to use ammonia test gas that can be purchased from Cool Air Inc. or their distributors. The detector is initially calibrated and programmed at the factory. However, if a new ammonia sensor is installed, the detector must be recalibrated.

All tests and calibrations must be recorded on an appropriate log sheet.

Testing the Detector

The detector hardware and the connected system response can be tested without exposing the sensor to ammonia. With the SET 1 jumper off, rotate the rotary switch to position 5. Pressing the “DOWN” button will force the detector to simulate an ammonia concentration equal to the LOW Alarm Set Point. Pressing the “UP” button will force the detector to simulate an ammonia concentration equal to the HI Alarm Set Point. The 4 to 20mA output current will indicate the simulated ammonia concentration according to the 4 to

20mA range selected. If the relay is set to latch, you will need to reset the relay after each test.

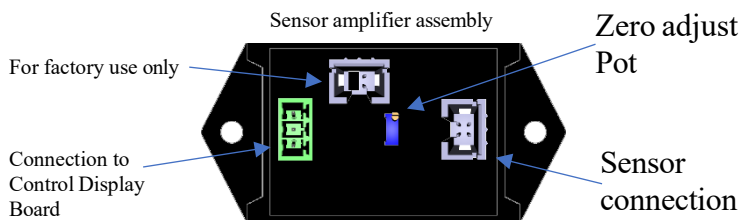
To test the detectors response to ammonia (for best results, allow at least 20 minutes after first applying power to the detector):

1. Open the detector enclosure and move the service jumper to the “ON” position, if needed. This step deactivates the Per-Alarm, 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 jumper in the “OFF” position.
2. Apply span gas (equal to or greater than the High Alarm Set Point) at 0.3 L/min (span gas must be in air, not nitrogen or another carrier).
3. Check the following:
 - When the ammonia concentration reaches the Low Alarm, set point the Low Alarm (yellow) LED will light.
 - When the ammonia concentration reaches the Alarm, set point the Alarm LED (red) will be on.
 - Digital display shows an increasing concentration of ammonia in %.
 - 4-20 mA output signal shows an increasing value that corresponds to the digital display per the 4 to 20mA range selected.
4. Remove the ammonia test gas.

Wait until the ammonia concentration reading is below the pre-alarm set point, then move the service jumper to the “OFF” position and close the detector enclosure. Remember, this step is only required if the service jumper was moved to the “ON” position in step # 1 above. Testing is now complete.

Calibrating the Detector

Zero offset adjust (this step is only necessary when a new sensor is installed)



If after the prescribed 20 minutes warm up the detector is not reading zero, follow these instructions to adjust the zero offset.

1. Open the detector enclosure and move the service jumper to the “ON” position, if needed. This step deactivates the pre-alarm, 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 jumper in the “OFF” position.
2. Adjust Zero pot on the sensor amplifier assembly until the display reads zero.

Follow these instructions to calibrate the span:

1. Open the detector enclosure and move the service jumper to the “ON” position, if needed. This step deactivates the pre-alarm, 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 jumper in the “OFF” position.
2. Install the jumper on the jumper pins (labeled “SET1”) located below the rotary selector switch on the front panel-mounted circuit board.
3. Set the rotary selector switch to position “9”.

4. Apply span gas certified span gas at 0.3 L/min (span gas must be in air, not nitrogen or another carrier). until a stable ammonia concentration reading is displayed. It might take several seconds for the reading to stabilize this should be at a maximum 60 seconds.
5. Press the “UP” or “DOWN” button until the display indicates the concentration of the known sample. For example, if the sample ammonia concentration is 1%, press the “UP” or “DOWN” button until the display indicates 1%.
6. If a fine adjustment is necessary Set the rotary selector switch to position “8” and repeat step 5.
7. Press and hold the “ENTER” button for at least 2 seconds.
8. Remove the span gas.
9. Move the jumper on the jumper pins (labeled “SET1”) located below the rotary selector switch on the front panel-mounted circuit board to just one pin.
10. Set the rotary selector switch to the desired position (typically “0”).
11. Wait until the ammonia concentration reading is below the pre-alarm set point, then move the service jumper to the “OFF” position and close the detector enclosure.
Remember, this step is only required if the service jumper was moved to the “ON” position in step 1 above. Testing is now complete.

TECHNICAL SUPPORT

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

Phone: (763) 205-0844 (USA)

Fax: (763) 432-9295 (USA)

E-mail: info@coolairinc.com

Web site: www.coolairinc.com

Address: Cool Air Incorporated
1544 134th Ave NE
Ham Lake, MN 55304
USA

Testing and maintenance supplies;

- Calibration and test kit P/N CAI-CAL-KIT
- Replacement sensor P/N %-NH3-RPL
- Ammonia 1% Calibration Gas Balance Air in a 34 Liter Aluminum Cylinder Connection Type C-10 P/N TG-1%-34L
- Ammonia 2% Calibration Gas Balance Air in a 34 Liter Aluminum Cylinder Connection Type C-10 P/N TG-2%-34L
- .3LPM, Toggle on flow valve, C10 inlet, 3/16" barb outlet, nickel plated brass P/N FLOW-REG-.3

WARRANTY

36-Month Limited Warranty & Limitation of Liability

1. Limited Warranty

Cool Air incorporated (CAI) warrants to the original purchaser and/or ultimate customer (“Purchaser”) of CAI ammonia leak detector (“Product”) that if any part thereof proves to be defective in material or workmanship within thirty-six (36) months from the date of shipment, such defective part will be repaired or replaced, free of charge, at CAI’s discretion if shipped prepaid to CAI at 1544 134th Avenue NE, Ham Lake, MN 55304, in a package equal to or in the original package. Before making the return shipment, contact CAI @ 763-205-00844 to request an RMA # to be prominently displayed on the returned package. The product shall be returned freight prepaid and repaired or replaced if it is determined by CAI that the part(s) failed due to defective materials or workmanship. The repair or replacement of any such defective part shall be CAI’s sole and exclusive responsibility under this limited warranty.

2. Inclusions:

- A. As of September 2, 2014, the defined Product that is covered by this thirty-six (36) month limited warranty is the LBW-50, LBW-420, LBW-420-1, LBW-RLV, and DCSAP.
- B. If an ammonia gas sensor is part of the Product, the ammonia gas sensor is covered by the same thirty-six (36) month limited warranty offered by CAI.
- C. For this thirty-six (36) month limited warranty to be fully effective, the Purchaser shall be responsible for following the manufacturer’s recommended monthly bump testing in critical areas, every 3-months bump testing in non-critical areas, and annual or twelve (12) month calibration service, which shall include proof of

recordkeeping for testing and calibration by the Purchaser.

3. Exclusions:
 - A. If an ammonia gas sensor is covered by this thirty-six (36) month limited warranty, the ammonia gas sensor shall be subject to inspection by CAI for abuse, misuse, negligence, damage by accident, abnormal conditions of operation, handling or use by the Purchaser. Should such inspection indicate that the ammonia sensor has prematurely failed due to abuse, misuse, negligence, or damage by accident or abnormal conditions of operation, handling or use by the Purchaser, this limited warranty shall not apply to the ammonia gas sensor.
 - B. This thirty-six (36) month limited warranty does not cover consumable items such as back-up batteries or ammonia test bottles.
4. Warranty Limitation, Inclusions, & Exclusions:

Cool Air Incorporated shall have no further obligation under this limited warranty. All warranty obligations of Cool Air Incorporated are extinguishable if the Product has been subject to abuse, misuse, negligence, or damage by accident or abnormal conditions of operation, handling or use by the Purchaser or if the Purchaser fails to perform any duties set forth in this limited warranty or if the Product has not been operated in accordance with the instructions, or if the Product serial number has been removed or altered.
5. Disclaimer of Unstated Warranties

The warranty printed above is the only warranty applicable to this purchase. All other warranties, express or implied, including, but not limited to, the implied warranties of merchantability or fitness for a particular purpose are hereby disclaimed

6. Limitation of Liability

7. It is understood and agreed that cool air Incorporated's liability, whether in contract, in tort, under any warranty, in negligence or otherwise shall not exceed the amount of the purchase price paid by the purchaser for the product and under no circumstances shall cool air incorporated be liable for special, indirect, or consequential damages. The price stated for the product is a consideration limiting cool air Incorporated's liability. No action, regardless of form, arising out of the transactions under this warranty may be brought by the purchaser more than five years after cause of actions has occurred.

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