DEFENDER®

Commercial Carbon Monoxide Detector Owner's Manual

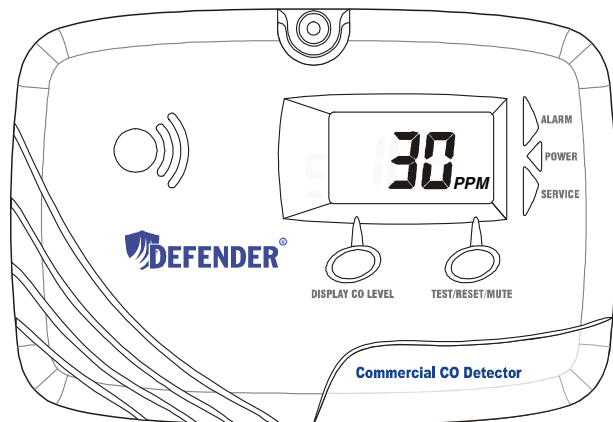## Sealed Lithium Battery Powered

CD8110

Sealed Lithium Battery Powered Commercial CO Detector, Single Station

DEFENDER®

ALARM
POWER
SERVICE

TEST/RESET/MUTE

Commercial CO Detector

CD8180

Sealed Lithium Battery Powered Commercial CO Detector with LCD Digital Display and Peak Level Memory, Single Station

30 PPM

ALARM
POWER
SERVICE

DEFENDER®

DISPLAY CO LEVEL   TEST/RESET/MUTE

Commercial CO Detector

CONTENTS OF THIS MANUAL

1. IMPORTANT MESSAGE AND INSTRUCTIONS

IMPORTANT!   READ ALL INSTRUCTIONS BEFORE INSTALLATION AND SAVE THIS MANUAL FOR FUTURE REFERENCE. *Do not try to repair this CO detector yourself.   Refer to the instructions in Section 13 for service.*

⚠ **CAUTION!**   THIS DETECTOR WILL ONLY INDICATE THE PRESENCE OF CARBON MONOXIDE GAS AT THE SENSOR. CARBON MONOXIDE GAS MAY BE PRESENT IN OTHER AREAS. THIS DETECTOR IS DESIGNED TO DETECT CARBON MONOXIDE GAS FROM ANY SOURCE OF COMBUSTION. IT IS NOT DESIGNED TO DETECT SMOKE, FIRE OR ANY OTHER GAS. THIS DETECTOR IS DESIGNED TO HELP PROTECT INDIVIDUALS FROM THE ACUTE EFFECTS OF CARBON MONOXIDE EXPOSURE. IT WILL NOT FULLY SAFEGUARD INDIVIDUALS WITH SPECIFIC MEDICAL CONDITIONS. IF IN DOUBT, CONSULT A MEDICAL PRACTITIONER.

⚠ **CAUTION!**   CO detection is best achieved by the installation of CO detectors in all rooms and areas of the building.

IMPORTANT!   Detectors must be replaced after five years from installation date. Write the replacement date onto the "REPLACE BY" label affixed to bottom of detector.

Add the telephone numbers of the local emergency service provider and a qualified technician to the self-adhesive labels provided.   Place one label next to the detector, and the other label near a source of fresh air where you plan to gather when the carbon monoxide alarm signals are activated.

After installation is completed, **TEST** the detector by pressing the **TEST**/**RESET**/**MUTE** button for at least 2 seconds. Detailed testing instructions are outlined in Section 9. If no alarm sounds, or low or erratic sound emits from the detector during a test, the unit may be defective and should be returned for service. (See Section 13)

CLEANING THE DETECTOR: You can clean the detector by using a vacuum cleaner brush to vacuum around the openings on the detector. The outside of the detector may be wiped with a lint-free cloth slightly dampened with water only**.** After cleaning, confirm that the **POWER** green LED flashes once every 60 seconds, and the model CD8180 displays 🔲 (see Operation in Section 8). Immediately test the detector by operating the **TEST**/**RESET**/**MUTE** button**.**

DO NOT PAINT THE DETECTOR: The paint will block the vents and affect the detector function.

DO NOT SPRAY AIR REFRESHENER, CLEANING SUPPLIES, OR INSECT KILLER ON OR NEAR THE DETECTOR: Certain kinds of aerosol chemicals will damage the sensor and cause improper operation. The building must be well ventilated when using cleaning supplies or similar contaminants.

2. WARNING MESSAGES

⚠ **WARNING!**

Actuation of this device indicates the presence of carbon monoxide (CO) which can KILL YOU.

⚠ **WARNING!**

This Commercial CO Detector is designed to help measure compliance with the U.S. Occupational Safety and Health Administration (OSHA) workplace exposure limits, and does not comply with ACGIH, Cal/OSHA or NIOSH, which recommend lower exposure limits than OSHA. Consult with your local authority about the exposure limits permitted for your workplace. To provide protection for individuals with medical conditions, consider using warning devices which provide audible and visual signals for carbon monoxide concentrations under 30 ppm.

⚠ **WARNING!** **Test the CO detector at least once a week**

⚠ **WARNING!** **Test the CO detector immediately after the building has been vacant.**
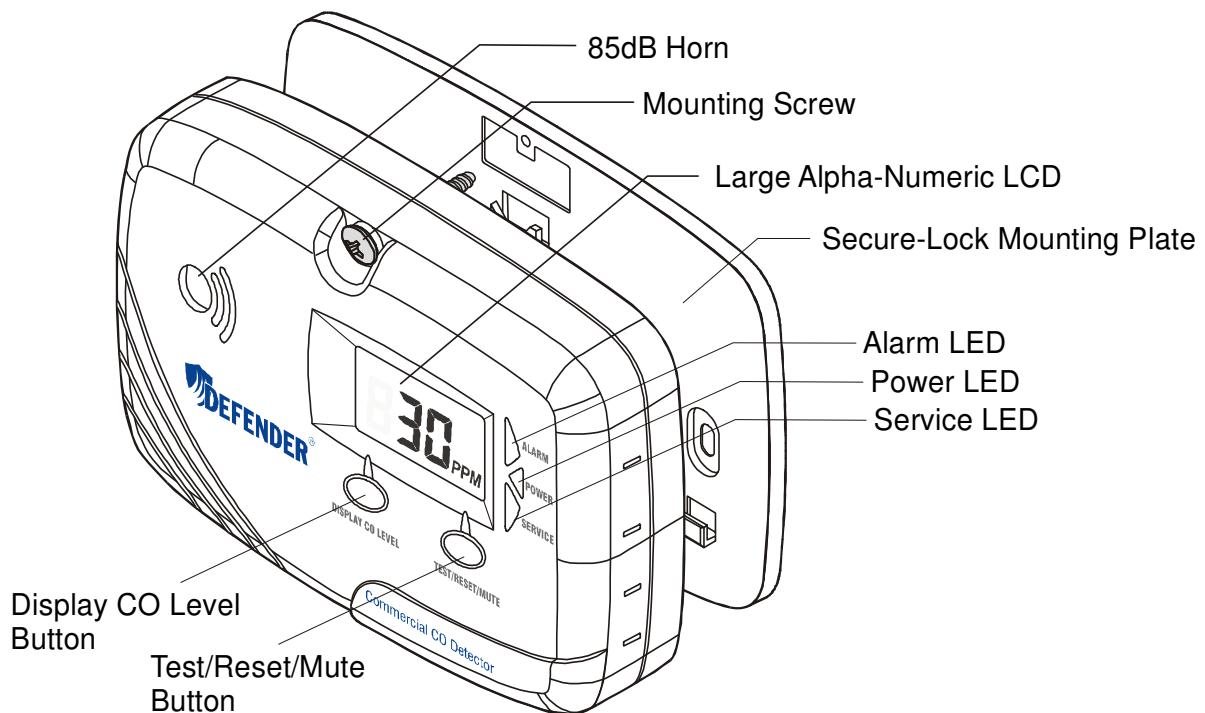
⚠ **WARNING!** **The loudness of the alarm sound may cause you to feel uncomfortable. Cover the horn opening with the palm of your hand to reduce the volume while testing the detector.**

⚠ **WARNING!** **Constant exposures to high or low temperature, or high humidity, may shorten battery life.**

3. FEATURES AND SPECIFICATIONS

- Commercial Carbon Monoxide Detector
- Factory Sealed Lithium Batteries with Soldered Connections
- Integrated Battery Activation/Deactivation Switch
- Accurate and Reliable Water-Based Electrochemical Sensor
- Integrated Filter for Removing Nuisance Gases
- Samples for Carbon Monoxide (CO) Every 10 Seconds
- Optional Alpha Numeric LCD Readout with Memory
- Separate Test and Optional Display Buttons
- Audible and Visual Alarm Signals
- Separate Alarm, Power and Service LED's
- Self Diagnostic Circuitry and Sensor Life Monitor
- Secure-Lock Mounting System
- Complies with OSHA Permissible Exposure Limit (PEL)
- Complies with UL 2034 Sensitivity Limits
- UL Tested and Listed to Latest ANSI/UL 2075 Standard
- Five Year Limited Warranty for Detector and Batteries

85dB Horn
Mounting Screw
Large Alpha-Numeric LCD
Secure-Lock Mounting Plate
Alarm LED
Power LED
Service LED
Display CO Level Button
Test/Reset/Mute Button

SPECIFICATIONS

CO Response Times:
    50 PPM: 120-360 minutes
    70 PPM: 60-240 minutes
   150 PPM: 10-50   minutes
   400 PPM: 4-15   minutes

Sensor Type:
   Electrochemical

Operating Temperature and Humidity:
   40°F to 100°F @ 10% to 95% RH

Audible Signal:
   Buzzer Horn Sounds 85 dB at 10 feet

Visual Signal:
   • Green LED Indicates Power On
   • Alarm Red LED Indicates CO Alarm
   • Service Red LED Indicates Service Required

Detection Frequency:
   Samples for CO every 10 seconds

LCD Display: Model CD8180
   • Automatic Digital Read-Out continuously displays current CO level detected from 30-999 ppm
   • Current Low Level Readout manually displays the current CO level detected within last minute from 9-999 ppm
   • Peak Level Memory manually displays highest CO level detected within last 30 days from 9-999 ppm
   • Peak Level Time Record manually displays total time the highest CO level was detected, within 10% of the peak, from 1-999 minutes
   • Display Tolerance ±20% from 30 to 400 PPM @ 50% RH, 72 ± 5 °F

Electrochemical Sensor:
   • Defender's CO detectors are programmed to accommodate sensor tolerance, and consistently activate an alarm signal at or below 50 PPM TWA within 6 hours of detection.
   • The sensor and display accuracy may be affected by environmental conditions and other circumstances beyond manufacturer's control.

Sensor Life Monitor
   Activates sensor expiration signal after five years of operation

Factory Sealed Lithium Batteries
   Two non-removable, non-replaceable ten-year lithium batteries

Electrical Rating:
   6VDC

4. INFORMATION ABOUT CARBON MONOXIDE

WHAT IS CARBON MONOXIDE?
Carbon monoxide (CO) is a highly toxic, invisible, odorless, tasteless gas.

HOW IS CO GENERATED?
Carbon monoxide is generated through incomplete combustion of fuel in various appliances. Faulty ventilation of furnaces, boilers, water heaters, fireplaces, wood burning stoves, and space heaters are the major cause of CO levels in a building. Automobile, forklift and small engine exhaust are another source of CO.

HOW DOES CO POISON PEOPLE?
The human body depends on oxygen for the burning of fuel (food) to provide us with the energy that allows our cells to live and function. Oxygen makes up approximately 21% of the atmosphere and enters our lungs when we breathe. In our lungs the oxygen combines with the hemoglobin in the blood (oxyhemoglobin), and is carried in the blood stream throughout the body where it releases oxygen to the cells.
Carbon monoxide is dangerous because it bonds more tightly to the hemoglobin (carboxyhemoglobin, COHb) than oxygen does. When CO combines with hemoglobin, the hemoglobin's ability to combine with oxygen is lost. As the COHb concentration rises, people become nauseous, unconscious and ultimately die (see below).
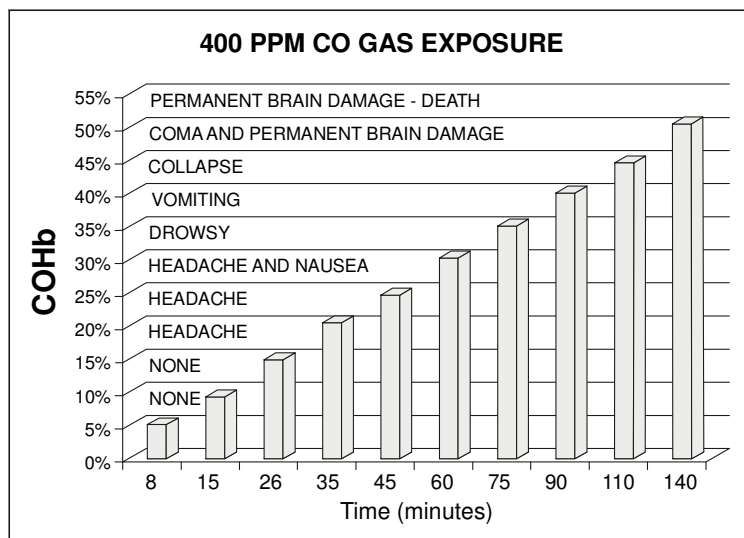
WHAT ARE THE SYMPTOMS OF CARBON MONOXIDE POISONING?
Many people often confuse carbon monoxide poisoning with the flu; the initial symptoms being very similar. Different concentrations of CO over various lengths of time cause different symptoms.
The following symptoms may be related to CARBON MONOXIDE POISONING and should be discussed with EVERYONE.

MILD EXPOSURE:	Slight headaches, nausea, vomiting, running nose, sore eyes, fatigue (often described as "Flu-like" symptoms).
MEDIUM EXPOSURE:	Severe throbbing headache, dizziness, drowsiness, confusion, fast heart rate.
EXTREME EXPOSURE:	Unconsciousness, convulsions, cardiorespiratory failure, brain damage, death.

Many cases of CARBON MONOXIDE POISONING indicate that while victims are aware they are not well, they become so disoriented that they are unable to save themselves by either exiting the building or calling for assistance. Older adults, young children, pregnant women (and their unborn children), and persons with medical conditions are typically the first affected.

400 PPM CO GAS EXPOSURE

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5.   RECOMMENDED LOCATION OF DETECTORS

CO poisoning can happen anywhere in the building. A CO detector should be installed on every floor, and inside or near every area or room that may be occupied.

Carbon monoxide at room temperature ($68^{o}F$) is slightly lighter than air (density of CO 0.96716 compared to air). CO detectors should be mounted five feet off floor, around eye level, for best operation and to easily test detector and view any display. Install a CO detector:

1. On every floor, at least one CO detector for every 1000 square feet of vertically unobstructed space.
2. Inside any room that is occupied by someone who may be hypersensitive to CO, such as older adults, young children, pregnant women, or persons with medical conditions.
3. Near each exit from the building and any maintenance room that contains combustion equipment, such that an alarm signal will be heard before anyone enters the building or maintenance room.

For residential areas within a commercial building, carbon monoxide alarms that are listed to the UL 2034 residential standard, like the Defender CA6150, should be installed inside or near every sleeping area or room, according to the manufacturer's instructions.

6. LOCATIONS TO AVOID

NEAR A COOKING AREA: Do not install the detector within five feet of any cooking appliances. CO may be generated in the cooking process and cause nuisance alarms. Also, cooking grease can build up on the detector and cause detector failure. Any detector that is installed near a commercial cooking area should be cleaned at least once every month, or more frequently if needed.

WITHIN FIVE FEET OF A FURNACE, BOILER, WATER HEATER, OR SPACE HEATER: These devices often spill out small amounts of CO when they first turn on.

IN GARAGES: Automobile exhaust contains CO and will activate alarm.

IN DUSTY AREAS: Dust can build up on detector and prevent it from working properly.

IN CLEANING SUPPLY ROOMS: Cleaning chemicals and painting supplies may cause nuisance alarms.

IN UTILITY OR BATH ROOMS: Do not install the detector inside or within three feet of a room with a bathtub, shower, spa or washer/dryer. Excessive moisture may cause nuisance alarms.

IN VERY HOT OR COLD AREAS: Do not install unit onto any exterior wall or in areas which are below 40ºF or above 100ºF.

IN DEAD AIR SPACE: Do not install detector within one foot of where wall meets ceiling or floor.
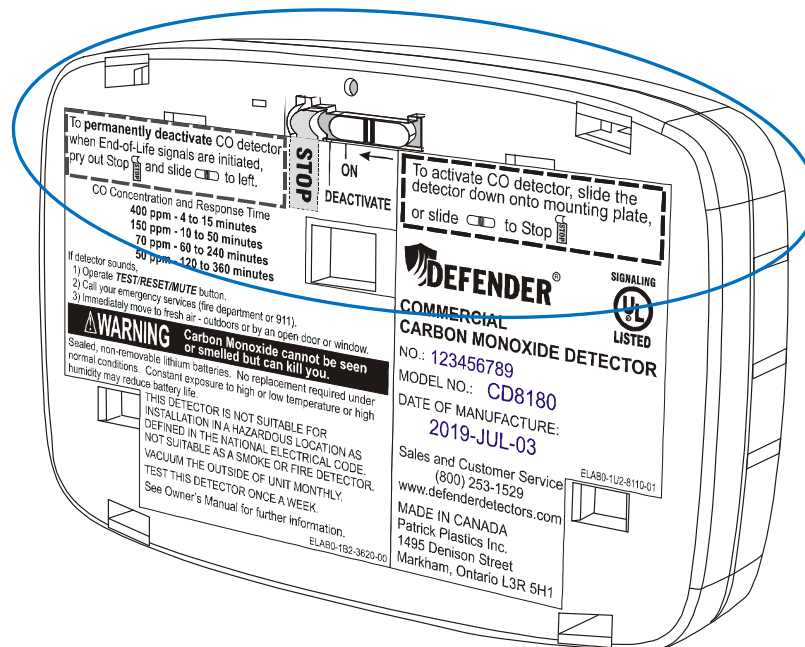
IN HAZARDOUS LOCATIONS: This detector is not suitable for installation in a hazardous location, as defined in the National Electrical Code.
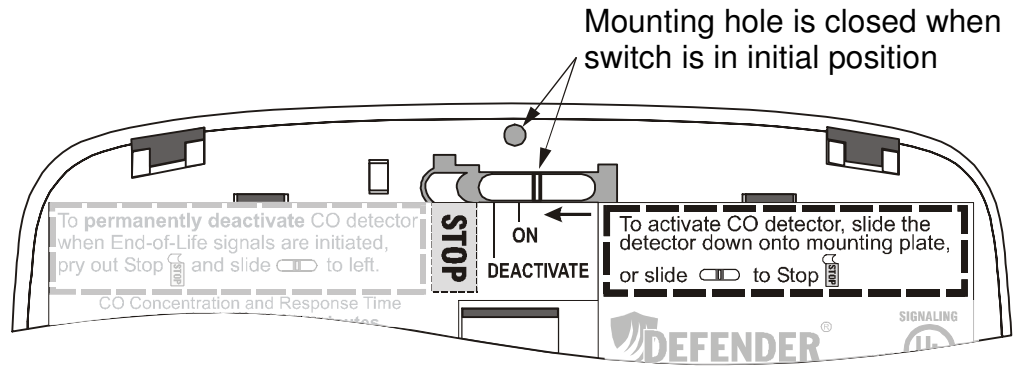
NEAR WIRELESS DEVICES: Do not install the detector within one foot of wireless devices. Radio Frequencies (RF) may interfere with the CO detector's proper operation.

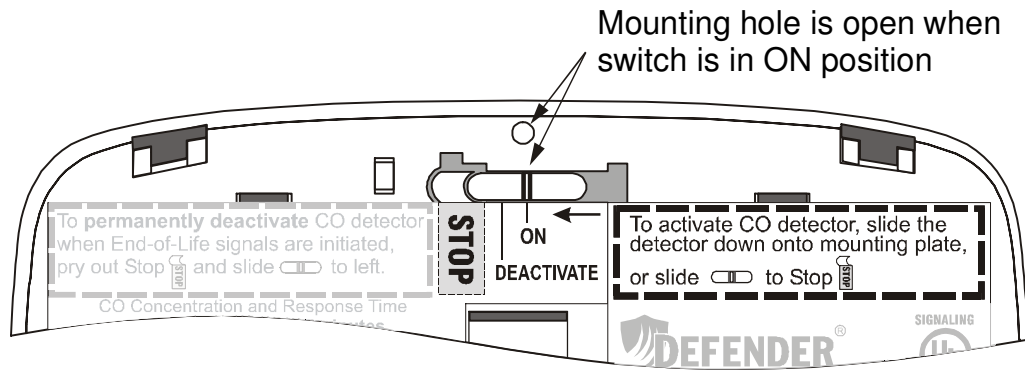# 7. INSTALLATION INSTRUCTIONS

Follow these steps to install the detector:
1. Review Section 5, **RECOMMENDED LOCATIONS OF DETECTORS**
2. Review Section 6, **LOCATIONS TO AVOID**
3. Fasten the mounting plate to the wall at eye level. Slide detector down onto mounting plate. The detector will be automatically activated.
4. It is important that you use the mounting plate provided. If the mounting plate is not used, you must slide the activation switch at the back of detector to the left until it meets the Stop, or ON position, as in diagram (B).
5. Once activated, the CO detector should operate for five years without battery replacement. The **POWER** green LED will flash once every 60 seconds, and model CD8180 LCD continuously display ⌷⌷ .
6. Press and hold test button until detector starts to beep, then release. The detector should beep 4 times, pause, then beep 4 times again. Alarm Red LED should flash at the same time.
7. Secure detector to mounting plate, with Phillips head screw provided, through the mounting hole on top of detector.
8. Be sure that the detector is not obstructed by furniture, drapes, etc.

Mounting hole is closed when switch is in initial position

To **permanently deactivate** CO detector when End-of-Life signals are initiated, pry out Stop and slide to left.

CO Concentration and Response Time

STOP

ON

DEACTIVATE

To activate CO detector, slide the detector down onto mounting plate, or slide to Stop

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SIGNALING

(A) Activation switch is not initially in ON position, the mounting hole at top of detector is blocked, and the CO detector is <u>not</u> yet activated.

Mounting hole is open when switch is in ON position

To **permanently deactivate** CO detector when End-of-Life signals are initiated, pry out Stop and slide to left.

CO Concentration and Response Time

STOP

ON

DEACTIVATE

To activate CO detector, slide the detector down onto mounting plate, or slide to Stop

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SIGNALING

(B) Detector is activated when switch is in ON position, and mounting hole at top of detector is open.

The models CD8110 and CD8180 are a sealed lithium battery powered wall mounted detector. Two 10-year lithium battery cells are permanently sealed with soldered connections, and cannot be removed. No battery replacement is required under normal conditions.

8. FUNCTIONS AND OPERATION

OPERATION: The CO detector is operational once the activation switch is slid to ON position, and a one minute warm-up is complete.   The **POWER** green LED will flash once every 60 seconds, and model CD8180 LCD continuously display $\boxed{\text{On}}$.

LOW BATTERY CONDITION: When the battery voltage drops below an acceptable level, the detector will chirp once per minute and the **POWER** green LED will blink 5 seconds every minute.   The model CD8180 LCD will also display $\boxed{}$ symbol.   The detector will continue to sample for carbon monoxide, and model CD8180 automatically display CO levels detected of 30 ppm or more, until battery power drops below minimum voltage requirement. See Section 13 for information regarding service.

SERVICE CONDITION: An internal microcontroller continuously monitors the sensor function and other critical components. If an internal failure of any of these components should occur, the detector will chirp twice (BEEP - BEEP) per minute, **SERVICE** red LED will blink for 5 seconds every minute, and model CD8180 LCD will continuously display $\boxed{\text{Err}}$. This malfunction condition indicates a problem with the unit. See Section 13 for information regarding service.

SENSOR END-OF-LIFE CONDITION: The electrochemical sensor has a minimum five year life expectancy. Once the batteries are activated, a microcontroller monitors the total time that the detector is under power. After five years of service, the sensor "End-of-Life" signal will be activated; the detector will chirp once per minute, and the **SERVICE** red LED will glow for 3 seconds at the same time. The model CD8180 LCD will also continuously display $\boxed{\text{End}}$ to indicate that the sensor life has expired and the detector must be replaced. See Section 13 for handling an End-of-Life alarm.

ALARM CONDITION: When the batteries are active, and CO gas is detected at a level and duration specified in Section 3 *CO RESPONSE TIMES*, the horn will sound and the **ALARM** red LED will light. The initial 5 minutes of an alarm signal will repeat 4 short beeps, 5 second pause, 4 short beeps, etc. Afterwards, the alarm signal will change to 4 short beeps with 60 second pause. The **ALARM** red LED will flash in sync with the beeping sound. The model CD8180 LCD will also display the current CO level detected. The alarm signal is either manually or automatically reset. See Section 10 *WHAT TO DO WHEN THE ALARM SOUNDS*.

TEST/RESET/MUTE BUTTON: The **TEST**/**RESET**/**MUTE** button is used to check the detector for proper operation, and to temporarily mute horn for 5 minutes when alarm is activated, for 24 hrs. during the first week of a "Low Battery Voltage" signal ($\boxed{}$) activation, or for 60 hrs. during the first month of an "End-of-Life" signal ($\boxed{\text{End}}$) activation. The model CD8180 LCD will display the current CO level detected when detector is being tested, or $\boxed{\text{OFF}}$ when an alarm signal is muted.   See Section 9 for detailed instructions to test the detector and mute the audible horn.

LCD DISPLAY FUNCTION (FOR MODEL CD8180):   When detector is operating normally, the LCD will continuously display $\boxed{\text{On}}$.   If a CO level of 30 ppm or more is detected, or alarm is activated, the LCD will automatically display the current CO level detected. The LCD will display the $\boxed{}$ symbol if the batteries have low voltage.
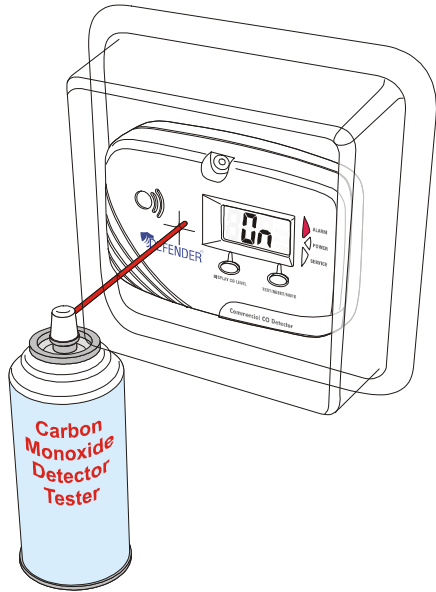
DISPLAY CO LEVEL BUTTON (FOR MODEL CD8180): To manually display the current and highest CO level detected, press and hold the **DISPLAY CO LEVEL** button until the LCD starts to display the recorded data in the following order:
1. The current CO level detected within the last minute from 9-999 ppm,
2. The highest (peak) CO level detected within last 30 days from 9-999 ppm, and
3. The total length of time the highest CO level has been detected, within 10% of the peak, from 1-999 minutes.

Each reading will appear for five seconds. To erase the record in memory, press the **DISPLAY CO LEVEL** button, and, while the readings are being displayed, press the **TEST/RESET/MUTE** button. The detector will burst a long beep, and display $\boxed{CLr}$.

9. TEST AND MUTE DETECTOR

Test the detector weekly by pressing the **TEST**/**RESET**/**MUTE** button on the cover and holding it down for a minimum of 2 seconds, or until the detector starts beeping and **ALARM** red LED flashes, then releasing. This test will simulate a CO concentration of approximately 300 ppm CO gas. The detector will sound 4 short beeps and **ALARM** red LED will flash at the same time, followed by a 5 second pause, and then repeat 4 more short beeps with flashing **ALARM** red LED if all of the electronic circuitry and buzzer are working correctly. The current CO level will also be displayed for model CD8180. To reduce the horn volume, place the palm of one hand over the horn opening.

In addition to the weekly simulation test, Defender Commercial CO Detectors should be tested with a UL Classified CO Detector Test Kit (CaT KIT[1] or equivalent) at least once per year.

Place the Tester's enclosure over the detector, and follow the Tester's instructions to perform the CO gas test correctly. The detector should activate the visual and audible alarm signals within 5 to 10 minutes, and model CD8180 display about 600 ppm, if the proper amount of CO gas is injected for about 5 to 6 seconds.

If too much CO gas is injected, the detector will trigger the trouble signal (2 short beeps, **SERVICE** red LED blinks for 5 seconds, and CD8180 LCD displays $\boxed{Err}$). Remove the enclosure from the CO detector and purge the CO with fresh air for a few minutes until the detector returns to normal (**POWER** green LED flashes once every minute, and CD8180 LCD displays $\boxed{On}$), then repeat the test with a lesser amount of CO spray.

When the detector's alarm signals are activated (**ALARM** red LED flashes in sync with 4 short beeps every 6 seconds), remove the enclosure from the CO detector, and press the **TEST**/**RESET**/**MUTE** button to silence the horn. When the CD8180 LCD displays $\boxed{On}$, press the **DISPLAY CO LEVEL** button, and, while the test data is being displayed, press the **TEST**/**RESET**/**MUTE** button to erase the record. The detector is now verified to be responsive to CO gas.

To mute the audible horn during an alarm signal, press the **TEST**/**RESET**/**MUTE** button. The **ALARM** red LED will flash 4 times, the model CD8180 will display $\boxed{OFF}$ for 5 seconds, and the horn will be temporarily silenced. If a CO level of 50 ppm or more continues to be detected, the audible and visual alarm signals will be automatically reactivated within 5 minutes. See Section 10 ***WHAT TO DO WHEN THE ALARM SOUNDS***.

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[1] CaT KIT is a registered trademark of HSI Fire & Safety Group, LLC

To mute the audible horn during a low battery signal ([🔋]) condition, press the **TEST/RESET/MUTE** button. The **POWER** green LED will blink for 5 seconds, the model CD8180 will display [OFF] at the same time, and the horn will be temporarily silenced for 24 hours. The low battery signal symbol [🔋] will be continuously shown in the CD8180 display. When the audible signal reactivates, you can continue to mute the horn for an additional 24 hour period by again pressing the **TEST/RESET/MUTE** button. The horn can only be turned off during the first 7 days of the low battery signal activation.   After 7 days, the detector will return to its normal low battery signal condition; 1 chirp per minute, **POWER** green LED blinks for 5 seconds, and model CD8180 continuously displays [🔋].

To test the detector during a low battery signal condition, press and hold **TEST/RESET/MUTE** button for minimum 2 seconds when the audible signal is not sounding.

To mute the audible signal during an "End-of-Life" condition, press the **TEST/RESET/MUTE** button. The **SERVICE** red LED will glow for 5 seconds, the model CD8180 will display [OFF] at the same time, and the horn will be temporarily silenced for 60 hours. When the audible signal reactivates, you can continue to mute the horn for an additional 60 hour period by again pressing the **TEST/RESET/MUTE** button. The horn can only be turned off during the first 30 days of the "End-of-Life" signal activation. After 30 days, the detector will return to its normal "End-of-Life" condition; 1 chirp per minute, **SERVICE** red LED glows for 5 seconds at the same time, and model CD8180 continuously displays [End] .

To test the detector during an "End-of-Life" condition, press and hold **TEST/RESET/MUTE** button for minimum 2 seconds when audible signal is not sounding.

The audible signal cannot be muted when detector is in **SERVICE** condition; chirps twice (BEEP - BEEP) per minute, **SERVICE** red LED blinks for 5 seconds, and model CD8180 continuously displays [Err].   See Section 13 for information regarding service.

10. WHAT TO DO WHEN THE ALARM SOUNDS

If alarm signal sounds:

1) **Operate test/reset/mute button;**
2) **Call your emergency services (tel. no. _____)
   [fire department or 911];**
3) **Immediately move to fresh air - outdoors or by an open door or window. Do a head count to check that all persons are accounted for. Do not re-enter the premises or move away from the open door/window until the emergency services responders have arrived, the premises have been aired out, and your detector remains in its normal condition.**
4) **After following steps 1- 3, if the alarm reactivates within a 24 hour period, repeat steps 1-3 and call a qualified appliance technician**

   (tel. no. _____) to investigate for sources of CO from fuel burning equipment and appliances, and inspect for proper operation of this equipment. If problems are identified during this inspection, have the equipment serviced immediately. Note any combustion equipment not inspected by the technician and consult the manufacturers' instructions, or contact the manufacturers directly, for more information about CO safety and this equipment. Make sure that motor vehicles or forklifts are not, and have not been, operating in an attached garage or adjacent to building.

MANUAL RESET: You can temporarily silence an audible alarm signal by pressing the **TEST/RESET/MUTE** button. The **ALARM** red LED will flash 4 times, and the model CD8180 will display $\boxed{\text{OFF}}$ for 5 seconds and then continue to display the current CO level detected from 30 to 999 ppm. If 50 ppm or more continues to be detected, the audible and visual alarm signals will be automatically reactivated within 5 minutes. Do not wait to see if the alarm is reactivated; follow above instructions immediately.

AUTOMATIC RESET: If a CO alarm activation is not manually reset, the horn will sound for at least 15 minutes. After 15 minutes, the detector will automatically reset itself and return to normal operation if the CO level detected drops below 10 ppm.

If the building has been temporarily vacant and you return to find the detector(s) sounding, do not enter the building. Call the Fire Department from another location. *Do not re-enter the building for any reason until you have been assured that it is safe to do so.*

Conditions which can result in transient CO situations:
1) **Excessive spillage or reverse venting of fuel burning appliances caused by outdoor ambient conditions, such as:**
   i) **Wind direction and/or velocity, including high gusts of wind. Heavy air in the vent pipes (cold/humid air with extended periods between cycles).**
   ii) **Negative pressure differential resulting from the use of exhaust fans.**

iii) **Simultaneous operation of several fuel burning appliances competing for limited internal air.**

iv) **Vent pipe connections vibrating loose from clothes dryers, furnaces, boilers, or water heaters.**

v) **Obstructions in or unconventional vent pipe designs which can amplify the above situations.**

vi) **Poorly designed or maintained chimneys and/or vents.**

2) **Extended operation of unvented fuel burning devices** (range, oven, fireplace, etc.).

3) **Temperature inversions which can trap exhaust gases near the ground.**

4) **Car or forklift idling in an open or closed attached garage, or near building.**

If service signal (chirps twice and SERVICE red LED blinks 5 seconds in every minute) or low battery signal (chirps once and POWER green LED blinks 5 seconds in every minute) are activated, see Section 13 for service and return instructions.

11. LIMITATIONS OF CO DETECTORS

Carbon monoxide detectors respond to the presence of CO. They do not detect smoke. If the alarm does activate, follow instructions in Section 10 **WHAT TO DO WHEN THE ALARM SOUNDS**.

Carbon monoxide detectors are devices that can provide an early warning of the presence of CO gas at a reasonable cost. However, detectors have sensing limitations and may not always sound a warning in the presence of CO. The detector will not operate if the battery power is low or dead. CO detectors must be tested regularly to ensure that they are receiving power and operating properly. Carbon monoxide detectors cannot sense CO that does not reach the detector, and therefore CO detectors may not detect CO which is in another area of the building. Furthermore, the detector may not alert someone who is located on a different level of the building or on the other side of a closed door. The use of drugs and alcohol may impair one's ability to hear the detector. If it is a multi-level building, install CO detectors on each level. If the detector is installed in a hallway and office or room doors are kept closed while occupied, install a CO detector within each office and room.

Although CO detectors can help save lives by providing an early warning to the presence of carbon monoxide, they are not a substitute for an insurance policy. Employers, property owners, leaseholders, and renters should have adequate insurance to protect everyone's health, lives and property.

12. GOOD SAFETY HABITS

DEVELOP AND PRACTICE A PLAN OF ESCAPE:

Make a floor plan indicating all doors and windows and at least two escape routes from each room within the building.

Have a meeting with everyone to discuss your escape plan, and show everyone what to do in case a detector sounds an alarm signal.

Determine a place outside the building where you can all meet if a detector sounds.

Familiarize everyone with the sound of an alarm signal, and train them to leave the building when they hear it.

Practice a CO fire drill at least once every six months. Practice allows you to test your plan before an emergency. You may not be able to reach everyone. *It is important that they all know what to do.*

Discuss the symptoms related to CARBON MONOXIDE POISONING with everyone. (See Section 4 **WHAT ARE THE SYMPTOMS OF CARBON MONOXIDE POISONING?**)
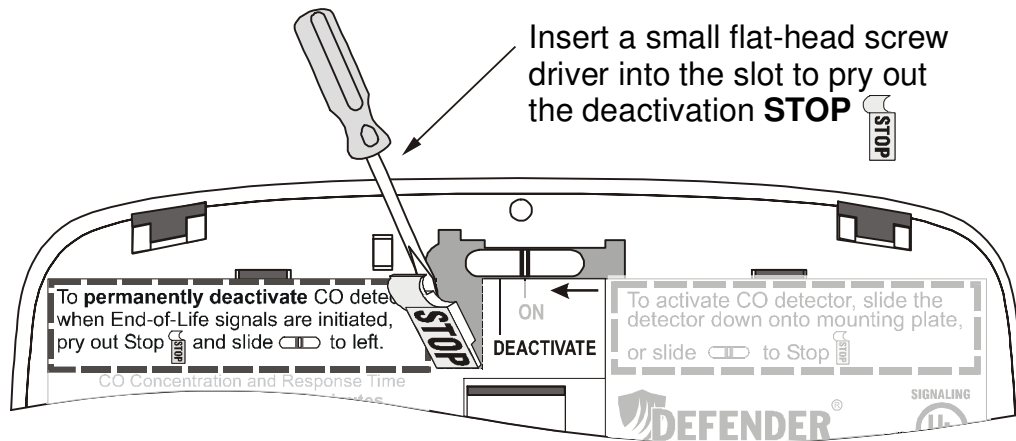
13. DETECTOR END-OF-LIFE AND SERVICE

After the detector has been activated for five years, the detector reaches the end of its life and emits the End-of-Life signal. The detector will chirp once per minute, **SERVICE** red LED will glow for 3 seconds at same time, and model CD8180 will continuously display $\boxed{End}$. The detector must be replaced once the End-of-Life signal has been activated. See below procedures to remove and deactivate the detector, and discharge the batteries. The detector can be disposed of using the same method for disposing of discharged lithium batteries.
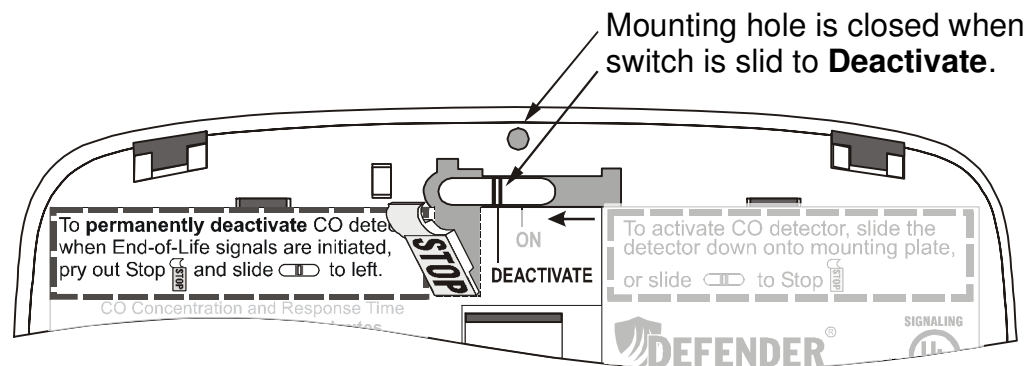
Should the low battery voltage signal occur in less than five years after initial activation, the battery power capacity may be low because of long-term storage prior to installation, exposure to low or high temperatures or high humidity during storage or operation, or abnormal usage. If the low battery voltage signal is activated in less than five years under normal conditions, press the **TEST/RESET/MUTE** button to mute the audible low battery voltage signal, and place the CO detector in an environment at 68°F or warmer. If the low battery voltage signal resumes within 24 hours, follow the steps below to deactivate the detector, and the instructions listed on the last page of this Owner's Manual to return the unit for warranty service.

In the event of any malfunction of the unit, the detector will chirp twice per minute, the **SERVICE** red LED will blink for 5 seconds every minute, and the model CD8180 will continuously display $\boxed{Err}$. Do not attempt to repair the detector. This product should be serviced by a qualified service technician. Follow the steps below to deactivate the detector, and the instructions listed on the last page of this Owner's Manual to return the unit for warranty service.

- To remove the detector for service or disposal, unscrew the mounting screw from the top center of the detector, and slide the detector up and off the mounting plate.

- Insert a small flat-head screwdriver into the slot, and pry out the deactivation Stop.

Insert a small flat-head screw driver into the slot to pry out the deactivation **STOP**

To **permanently deactivate** CO dete... when End-of-Life signals are initiated, pry out Stop and slide to left.

CO Concentration and Response Time

ON
DEACTIVATE

To activate CO detector, slide the detector down onto mounting plate, or slide to Stop

SIGNALING
DEFENDER®

- Slide the switch to the farthest left end to deactivate the detector. The switch moves in one direction only, and cannot be moved back. Once the detector is deactivated, the sealed lithium batteries will be fully discharged and the detector will no longer work.

Mounting hole is closed when switch is slid to **Deactivate**.

To **permanently deactivate** CO dete... when End-of-Life signals are initiated, pry out Stop and slide to left.

CO Concentration and Response Time

ON
DEACTIVATE

To activate CO detector, slide the detector down onto mounting plate, or slide to Stop

SIGNALING
DEFENDER®

- Detector is permanently deactivated when switch is moved to left past **STOP** and mounting hole is closed.

14. DESCRIPTION OF AUDIBLE AND VISUAL SIGNALS

Condition	LCD Readout	LEDs	Horn
CO detector is operational	Displays ⌐Un⌐ continuously	**POWER** green LED flashes once every 60 seconds	Silent
CO gas alarm	Displays current CO reading in PPM	**ALARM** red LED flashes 4 times in synchronous with horn	Beeps 4 times, pauses for 5 seconds. Repeats this pattern for first 5 minutes. Then pause time increases to 60 seconds.
Mute CO alarm audible signal	Displays ⌐OFF⌐ for 5 seconds	**ALARM** red LED flashes 4 times	Silent
CO gas alarm in Silent mode	Displays current CO level in PPM	**POWER** green LED flashes once every 60 seconds	Silent for 5 minutes
Testing detector	Displays current CO level detected	**ALARM** signals are same as CO gas alarm condition, and **POWER** green LED blinks once when testing complete	Beeps 4 times, pauses for 5 seconds, then beeps 4 times again
Display CO Level	Displays current and highest CO levels detected, and duration of peak CO level. Each readout lasts 5 seconds	**POWER** green LED blinks once when CO level display readout is completed	Silent
Clear Peak Memory	Displays ⌐CLr⌐	**POWER** green LED blinks once when clear peak memory is completed	Bursts a long beep
Low battery voltage	Displays ▭ symbol	**POWER** green LED blinks for 5 seconds every minute	Chirps once per minute
Mute "low battery voltage" audible signal	Displays ⌐OFF⌐ for 5 seconds	**POWER** green LED blinks for 5 seconds	Silent
Low battery in Silent mode	Displays ▭ symbol	**POWER** green LED blinks for 5 seconds every minute	Silent for 24 hrs during the first week
"End-of-Life"	Displays ⌐End⌐ continuously	**SERVICE** red LED glows for 3 seconds every minute	Chirps once per minute
Mute "End-of-Life" audible signal	Displays ⌐OFF⌐ for 5 seconds	**SERVICE** red LED glows for 5 seconds, then Green LED blinks once	Silent
"End-of-Life" in Silent mode	Displays ⌐End⌐ continuously	**SERVICE** red LED glows for 3 seconds every minute	Silent for 60 hrs during the first month
Service required	Displays ⌐Err⌐ continuously	**SERVICE** red LED blinks for 5 seconds every minute	Chirps twice (BEEP-BEEP) per minute

15. FIVE-YEAR LIMITED WARRANTY

The Defender commercial carbon monoxide detectors are manufactured in Canada under stringent ISO 9001 quality management practices. The manufacturer warrants that, for a period of five years from the date of purchase, this carbon monoxide detector will be free from defects in material and workmanship, and the factory sealed lithium batteries will power the CO detector for five years. The manufacturer, at its option, will repair or replace this product or any component of the product found to be defective during the warranty period. Replacement will be made with a new or re-manufactured product or component.

If the product is no longer available, replacement may be made with a similar product of equal or greater value. This warranty is valid for the original end-user purchaser from the date of initial purchase from an authorized distributor, dealer or contractor, and is not transferable. Keep the original sales receipt. Proof of purchase is required to obtain warranty service. Distributors, dealers or contractors selling Defender products do not have the right to alter, modify or in any way change the terms and conditions of this warranty.

This warranty does not cover normal wear of parts or damage resulting from any of the following: improper storage, negligent use or misuse of the product, use contrary to the operating instructions, operation in unconditioned space (below 40°F or above 100°F), disassembly, or repair or alteration by anyone other than the manufacturer or an authorized service center. Further, the warranty does not cover acts of God, such as fire, flood, earthquakes, hurricanes and tornadoes.

The manufacturer shall not be liable for any incidental or consequential damages caused by the breach of any express or implied warranty. Except to the extent prohibited by applicable law, any implied warranty of merchantability or fitness for a particular purpose is limited in duration to the duration of the above warranty. Some states or jurisdictions do not allow the exclusion or limitation of incidental or consequential damages or limitations on how long an implied warranty lasts, so the above limitations or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

Warranty Service:

If service is required, do not return the product to your supplier. Contact our U.S. manufacturer's representative, Don Smith & Associates, Inc. at (800) 253-1529, Monday through Thursday, from 8 AM to 4 PM MST to obtain a Return Authorization (RA) number. To assist in serving you, please have the model number, date of purchase, and manufacturing date available when calling.

Prior to returning, deactivate the detector per the instructions in Section 13, pack carefully in a padded box, and ship freight prepaid with your original sales receipt, an explanation of the problem, and your return address.

DEFENDER®

Sales and Customer Service
(800) 253-1529
www.defenderdetectors.com

MADE IN CANADA
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Markham, ON L3R 5H1