

# CGM 900 II AutoCal<sup>®</sup> Series

## Operation Manual



**GfG Instrumentation**

Worldwide Manufacturer of Gas Detection Solutions



# TABLE OF CONTENTS

	<b>Page</b>		<b>Page</b>
For your safety.....	3	Introduction to error protected	
General description.....	3	auto zero and AutoCal® .....	14
New housing design and easy to		Error protected auto zero .....	15
grip boot.....	3	Error protected AutoCal®.....	16
Detection principles.....	4	Auto zero / AutoCal®	
Catalytic combustion (CC) .....	4	troubleshooting.....	17
Electrochemical sensor (EC).....	4	Failure to auto zero.....	17
Metal oxide semiconductor (MOS)5		For your safety.....	18
Operating the CGM II .....	5	Calibrating the CGM II monitor .	18
Detection mode.....	5	Bump / test .....	20
Switching ON/OFF.....	5	Maintenance .....	20
DATA key.....	6	Battery replacement.....	20
HOLD key.....	6	Sensor replacement.....	20
FUNCTION (GfG) key.....	6	Oxygen sensor .....	21
Accessory modes .....	7	Toxic sensor replacement.....	21
Pump mode .....	7	Adding or substituting different	
Alarm mode.....	8	toxic sensors.....	23
Standard mode .....	8	Combustible sensor.....	23
ToxAlert zero .....	8	ToxAlert sensor .....	23
Additional operating features... 8		Reassemble .....	24
Alarms and display .....	8	Start-up following a sensor	
Charging .....	9	change .....	24
Battery gauge.....	9	Glossary.....	25
Back lighted display .....	10	Replacement parts and	
Operating auxiliary equipment 10		accessories .....	26
Pump .....	10	Replacement parts .....	26
High intensity alarm.....	11	Accessories .....	26
PC data logger downloading.... 11			
Advanced operation .....	11		
Set-up mode .....	11		
How to operate the hand			
aspirator .....	14		
Calibration.....	14		

## **For your safety**

As with any piece of complex equipment, the CGM II will do the job it is designed to do, only, if it is used and serviced in accordance with the manufacturer's instructions. This manual must be carefully read by all individuals who have or will have the responsibility for using and servicing this product.

The warranties made by GfG Instrumentation with respect to the product are voided, if the product is not used and serviced in accordance with the instructions in this manual. Please protect yourself and your employees by following them. The above does not alter statements regarding warranties and the conditions of sale and delivery offered by GfG Instrumentation.

## **General description**

The CGM II combines the best available gas sensors with advanced micro processing electronics for a truly superior confined space instrument. The CGM II is a Multi-gas detector with ToxAlert protection for toxic gases, oxygen and combustible gases. Depending on the model, the CGM II is available with three to five sensors. The AutoCal® feature of the CGM II greatly simplifies and reduces the time required for calibration. To assist you in tracking your calibration history the CGM II displays the last successful calibration date and time when first switched on. This calibration data is recorded in the individual sensor's memory and remains with the sensor when removed or replaced in the monitor. This instrument is approved for intrinsic safety (UL 913).

## **New housing design and easy to grip boot**

The CGM II comes with design innovations that you have come to expect from GfG, with a new black case and an easy-

to-grip boot. The rubber armored, non-slip boot gives a good grip and impact protection. The standard belt clip, D-rings and shoulder strap allow for multiple carrying options. The boot provides greater protection against damage caused by water ingress.

### **Detection principles**

The CGM II uses different detection principles for measurement and detection of gases and vapors. Catalytic combustion (CC) has proven a reliable method for monitoring explosion hazards caused by combustible gases. Electrochemical sensors (EC) are used for measuring toxic gases and oxygen.

### **Catalytic combustion (CC)**

For measuring combustible gases and vapors up to 0–5 %Vol. (0 – 100 % LEL) methane, a catalytic combustion sensor is used. The gas diffuses through a sintered filter into the sensor chamber with an active and a passive filament. At the heated active filament the gas is burnt, thus causing a temperature increase, which results in a change of the electrical resistance. The change of resistance is proportional to the gas concentration. The active and the passive filament (reference sensor) are exposed to the same ambient conditions, ensuring a compensation of environmental effects (e.g. temperature changes).

### **Electrochemical sensor (EC)**

The electrochemical sensors contain the electrolyte, a working electrode (anode), a counter electrode (cathode) and a reference electrode. By selection of specific electrodes and electrolytes the sensors are adapted to the gas to be measured. The conversion of the gas between the electrolyte and the electrode generates an electrical signal, which is

proportional to the gas concentration. GfG sensors use the capillary diffusion barrier technology. This method allows accurate measurement even when changes in atmospheric pressure and temperature occur.

### **Metal oxide semiconductor (MOS)**

The ToxAlert sensor is a semiconductor used for the detection of hydrocarbons and solvents gases. The semiconductor is an electrical resistance in a bridge. The semiconductor is heated up to 300°C. If the measuring gas is absorbed, the resistance changes. The change of the resistance is proportional to the gas concentration.

## **Operating the CGM II**

### **Detection mode**

#### **Switching ON/OFF**

Turn the unit On with the ON/OFF key and the unit will initiate a one-minute warm-up. During the warm up the last successful calibration date and time is displayed for each sensor. At the end of the countdown the instrument will zero the toxic and combustible channels and calibrate the oxygen channel if the background air is within standard limits. If one of the sensors is detecting gas, its channel will fail to auto zero and the last previously successful zero will be used. (See auto zero discussion.) Following the warm-up, a warning message appears indicating either that the unit has zeroed or that the previous settings are being used.

After the countdown the standard gas exposure display will appear.

To turn the CGM II Off, press and hold the ON/OFF key for three seconds. This feature is designed to prevent accidental shut-off.

**NOTE:** The CGM II cannot be turned off prior to the countdown.

### **DATA key**

Pressing the DATA key will display the TWA values for toxic gases, peaks for combustible, oxygen, and toxic gases as well as the total run time. (See glossary for an explanation of TWA.) Pressing it again will return the display to the standard gas exposure mode. Holding the key depressed until a second beep occurs will cause the data logger to record the gas values.

### **HOLD key**

When the HOLD key is depressed the unit will retain (latch) the peak readings. This feature is useful for taking readings prior to entering a confined space. When in the peak HOLD mode, an icon symbolizing mountain peaks will appear in the upper right corner of the display. The unit beeps once every 10 seconds alerting you that you are in the hold mode. If the unit is lowered into a confined space and then removed, the peak values will be retained on the display. If a gas exposure reaches the alarm point, the alarm will sound until the HOLD key is again pressed, releasing both the display and the alarm.

### **FUNCTION (GfG) key**

- Hold for 2 beeps to select CO or H<sub>2</sub>S reading (Model 902 only).
- Hold for 4 beeps to select mode setting for accessories (pump, standard mode or external alarm).
- Hold for 6 beeps to zero the ToxAlert channel.

Model 902 with DualTox Only – holding the “GfG” key depressed for two (2) beeps will move the toxic gas exposure

display from CO to H<sub>2</sub>S or vice versa. Generally the unit should be set to the gas that is most likely to be encountered. Remember that both H<sub>2</sub>S and CO will be detected and shown on the one reading. When set to read CO, the default alarm points are 35 ppm peak and 35 ppm TWA. When reading H<sub>2</sub>S the default peak alarm will be 10 ppm peak and 10 ppm TWA. If the CGM II is being used in an environment where H<sub>2</sub>S gas is potentially present, it is recommended that the H<sub>2</sub>S display be selected. This gives an extra margin of protection if CO is present – alarming @ 46 ppm CO peak and 31 ppm CO TWA.

### **Accessory modes**

Because the PTO port is used to connect and power accessories, it is necessary to program the monitor for the accessory in use. Three different modes will be displayed while pressing and holding the "GfG" key. Release the key after all beeps stop (several seconds will elapse between sequences of beeps). The order in which these appear will depend upon the beginning mode.

The monitor is shipped from the factory in standard mode, To set up the monitor for one of the other accessories observe the following instructions. (Prompt screens will also guide you as you hold down the "GfG" key.)

### **Pump mode**

Holding the "GfG" key firmly depressed for 4 beeps will program the monitor for the pump. The display will read [PUMP MODE NOW]. Release the key. Power is now directed continuously through the PTO connector for the pump. Since an intermittent "low flow alarm" occurs when in the pump mode if the pump isn't operating, it is advisable to set the unit to the standard mode when the mini-pump is not attached.



Note: If the accessory alarm and light is attached in pump mode it will begin to alarm and can only be stopped by removing it from the monitor or turning the monitor off. To correct, advance the mode setting to [EXT ALRM MODE NOW].

### **Alarm mode**

The high intensity light/horn accessory requires the mode setting be advanced by again pressing and holding the "GfG" key for four (4) beeps. The display will indicate [EXT ALRM MODE NOW]. Release the key and install the accessory light/horn.

### **Standard mode**

To return to the standard mode (normal setting) repeat the procedure by holding the "GfG" key for 4 beeps and the display reads [RA MODE NOW]. This setting permits the PTO connector to be operated as an output for transferring data to a PC.

### **ToxAlert zero**

The "GfG" key is used to manually zero the ToxAlert channel. Firmly hold the key for 6 beeps (the monitor must be warmed up for five minutes before an accurate zero of the ToxAlert channel can be accomplished.) This procedure is not normally required and should be attempted only in known clean air.

## **Additional operating features**

### **Alarms and display**

The CGM II is equipped to alarm at both peak and time weighted average. With the mini-pump attached, a low flow alarm and a low flow message on the display will occur if the

pump is not operating properly or the intake is blocked. A gas reading at or above the alarm level will activate the alarm light and horn and cause the gas reading to flash. In the case of a TWA alarm, the standard exposure display alternates with the letters "TWA".

A "FLT" message indicates that the zero readings have fallen below zero. Turn the unit off and back on to initiate a new auto zero. When the low battery alarm sounds, the battery icon will begin to flash. The unit will turn off automatically in approximately 15 minutes after the low battery alarms.

## **Charging**

Always place the CGM II on the charger when not in use. The unit will rapid charge until the battery pack is about 90% charged and then trickle charge thereafter. During charge the display will indicate which part of the charging cycle the instrument is in.

Eight hours of rapid charging are required to bring totally discharged batteries to 90% of their capacity. Another few hours of trickle charging will bring them to 100% of capacity.

**Note:** If the run time decreases it can usually be restored by allowing the unit to totally discharge before placing on the charger.

## **Battery gauge**

The battery gauge is a measure of the battery voltage. The voltage decreases as the unit is used. However, the battery voltage drop is not linear throughout the discharge period. The batteries discharge quickly when initially removed from the charger and then hold their voltage fairly constant throughout the run time until discharging rapidly during final

hours of use. The battery gauge icon will display this gradual decrease until the end of the cycle when the discharge rate increases. The battery gauge is to be used as an approximate indication of the run time remaining. A low battery alarm indicates approximately 15 minutes until the monitor shuts itself off.

### **Back lighted display**

Backlighting of the display is automatic in a dim environment. Covering the clear light sensor (sentinel) will increase the back lighting. Backlight use will consume more battery power and reduce the run time.

### **Operating auxiliary equipment**

The PTO port operates the mini-pump, high intensity alarm accessories and data off-load function to the PC.

The unit can operate as a data logger with any accessory attached. To off-load data, remove the pump or high intensity alarm from the PTO and connect to the PC (using the accessory interconnect cable, part number 4003-195).

### **Pump**

To use the mini-pump, follow the prompts displayed when the "GfG" key is pressed. The mini-pump plugs into the PTO port and fastens to the sensor bay with the captive screw. The PTO cap is stored in the opening formed by the pump and instrument. When the CGM II is turned on and the program set to PUMP MODE as described, the pump will also turn on.

**CAUTION: Do not operate the monitor in PUMP MODE without the hydrophobic filter in the sample**

## **draw tube or damage to the monitor may occur.**

When a blockage or low flow occurs in the inlet, the CGM II will alarm and a "Low Flow" warning appears on the display. A hydrophobic filter on the pump's sample wand prohibits water from entering the pump.

### **High intensity alarm**

Attach the HiLite to the monitor by connecting it to the PTO port and fastening the captive screw that attaches the unit to the monitor's grill cover. Set the monitor to the external alarm mode with the "GfG" key.

### **PC data logger downloading**

To download the CGM II data to a PC, follow the CGM II manual for instructions. If an accessory is attached, it needs to be removed from the PTO and replaced with the PC cable before transferring data.

### **Advanced operation**

#### **Set-up mode**

To enter the set-up mode turn the unit off. Press and hold the HOLD key while turning the unit on, and then release each key when the SET-UP message appears.

The first screen will indicate the alarm level for the ToxAlert Channel. The ON/OFF key will reduce the numerical value while the "GfG" key will increase it. Press HOLD to index to the next screen. Choose HIGH, LOW, or NORMAL sensitivity for the ToxAlert channel by pressing the ON/OFF and "GfG" keys. Press HOLD to index.

The display will read combustible gas in % LEL methane (Standard), butane, hexane or %V methane. The ON/OFF and "GfG" keys will change the setting.

Note: The calibration gas is assumed to be methane and these readout gases are based on known conversion factors.

Pushing the HOLD key again will index the display to the combustible sensor's alarm point. Pushing the ON/OFF key will lower the alarm point. Pushing the "GfG" key will raise the alarm point. Pushing the HOLD key again will index the display to the next sensor's alarm point setting.

Note: Optional alarm settings are factory limited to a range considered to be safe in most applications but the factory settings correspond to OSHA standards and should not be reset unless the user has sufficient experience and special reasons for doing so.

The standard alarm value for the combustible sensor is 10% LEL or .5% V on methane (natural) gas depending which scale you select. The normal display or ZERO reading for this sensor is 0.

The normal percentage of oxygen in air throughout the world is 20.9% V. This will appear on the standard display and is the ZERO point for the oxygen sensor. The oxygen low alarm is set at 19.5% V and enrichment alarm at 23.5% V.

The peak alarm for CO is the ceiling/STEL value of 200 ppm (factory set to 35 ppm) and the TWA value of 35 ppm when the instrument reads CO. Normal or ZERO reading for this sensor is 0.

The peak alarm for H<sub>2</sub>S is the ceiling/STEL value of 15 ppm (factory set to 10 ppm) and the TWA value of 10 ppm when the instrument reads H<sub>2</sub>S. Normal or ZERO reading for this sensor is also 0.

**Note:** Model 902 users – When changing the display from CO to H<sub>2</sub>S or vice versa with the “GfG” key, the alarm levels will also be switched to the appropriate values indicated above.

Alarm settings for all chemical cell toxic sensors are stored on the smart sensor and normally correspond to OSHA guidelines. Normal or ZERO readings for all toxic sensors are 0.

The broadrange ToxAlert sensor responds to most VOCs (volatile organic compounds) and oxidizable hydrocarbons. The intent of this sensor is to ensure protection from many gases instead of a single specific gas, as is the case with the chemical cell sensors. The alarm setting and sensitivity are somewhat arbitrary, based on many years experience with this sensor in a variety of applications. It is set to one-half scale when calibrated with GfG 3-way calibration gas (200 ppm CO and 50% LEL methane). The alarm point and the sensitivity setting may need to be adjusted to provide the right balance between protection and unnecessary nuisance alarms in your application. The HIGH SENSITIVITY setting may be used for leak detection or conversely LOW SENSITIVITY can be used in environments known to contain gas or vapors where the alarm would not contribute to worker safety.

After setting the alarm points, the date and time may be changed using the ON/OFF and “GfG” keys.

After indexing through all the set-up displays, the unit will go into its 60 second warm up followed by the standard gas exposure display. To re-enter the set-up mode turn the unit off by holding the ON/OFF key for three seconds and again depressing the HOLD key while pressing the ON/OFF key.

### **How to operate the hand aspirator**

Attach the aspirator cup as you would normally attach the calibration cup, paying careful attention to cup orientation. To obtain an accurate sample reading, place the end of the wand in the area to be sampled. Slowly squeeze the aspirator bulb one time for each foot of tubing length, to allow the sample to completely permeate the sensor area. Continue to squeeze the aspirator bulb until the sensor readings stabilize.

### **Calibration**

#### **Introduction to error protected auto zero and AutoCal®**

CGM II instruments incorporate the very helpful AutoCal® function. AutoCal® greatly simplifies the operation of the CGM II, making it both easy to maintain and accurate. An easy to use, accurate monitor increases worker safety. To insure AutoCal® is dependable, protection is included to prevent false calibration. This could occur if the wrong test gas is used, a worn out sensor is present, or the unit warms up in an atmosphere where gas is present.

The CGM II uses “error protection” to prevent these calibration errors. There are three safety checks that the computer uses to avoid calibration errors.

- First – to accept auto zero, a minimum variation from a base zero value is required. This prevents zeroing in a toxic or combustible background.

- Second – to AutoCal®, a minimum response to calibration gas is required. This prevents calibration on weak or faulty sensors nearing the end of their useable life.
- Third – the change to the calibration gain settings for all sensors must not exceed an allowable percentage of the previous calibration gain settings. Error protection will allow auto-calibration only when all these requirements are met.

When a unit is new, the sensors require some burn-in (settling or seasoning) time. They are exposed to varying conditions in shipping, including high heat and freezing. **It is not unusual under these conditions for new units or those that have not been used recently, to require the error protection be temporarily disengaged.** The error protection must temporarily be disengaged to allow gain adjustments that would otherwise exceed the acceptable parameters for AutoCal®. We will refer to this procedure as “manual calibration”.

The error protection for minimum sensor response cannot be disengaged. Under normal operating conditions the CGM II will AutoCal® and no user intervention will be required.

### **Error protected auto zero**

In the event the CGM II does not auto zero following the normal one minute warm-up, the instrument will continue to use the values established by the last successful auto zero. This is normal and safe however, the error protection for auto zero can be disengaged by turning the monitor off, then on to repeat the warm-up. Press and hold the HOLD key for the final five seconds of the countdown to establish a new zero.



**CAUTION: Alcohol, esters and certain other gases as well as CO can interfere with the auto zero. It is highly advisable to remove the instrument to a fresh air environment before repeating the auto zero.**

Exercise extreme caution when deciding to disengage the zero protection. The most common reason for an unsuccessful Auto zero is the presence of toxic or combustible gas in the atmosphere when the instrument is turned on. Overriding the error protection in the presence of gas will cause the instrument to read incorrectly and can be potentially dangerous.

**CAUTION: Do not disengage the auto zero error protection unless you are in clean, fresh air. Never turn the monitor OFF and ON in an alarm situation. Always leave the area first when an alarm sounds and follow your company's safety policies.**

### **Error protected AutoCal®**

A sensor can fail to AutoCal® under two conditions:

1. When the sensor response to gas is too low, or
2. A large gain adjustment is required based on the setting from the last calibration.

A weak sensor response (condition 1) will cause the following error messages to appear sequentially on the display following countdown: [CO (or other sensor) NOT CALED] [SERVICE SENSOR] [PUSH HOLD] [TO ACKNOWLEDGE].

**WARNING: The user will not be protected by this sensor! (condition 1)**

A sensor gain adjustment that is too large to be acceptable for AutoCal® (condition 2) will cause the following messages to be displayed following the calibration countdown: [CO (or other sensor) NOT CALED] [PUSH HOLD TO] [MANUALLY CAL]. Press HOLD when instructed to complete the calibration of the sensor.

Follow the additional prompt messages to complete the calibration.

**CAUTION: Be sure you are using the correct calibration gas and flow rate when the error protection is disengaged.**

If the unit is calibrated frequently, **calibration will usually be automatic**. If the unit goes for extended periods without calibration, however, it may be necessary to override the error protection because large changes in sensor output have occurred since the last calibration. The override will not allow a manual calibration when a sensor's output is too low.

### **Auto zero / AutoCal® troubleshooting** **Failure to auto zero**

May be caused by the following conditions:

1. Gas or vapors are present in the atmosphere and the error protection is alerting you to unclean air. Solution: Go to a fresh air environment or use calibration air (zero gas) during the warmup countdown following turn on. **NOTE: Never attempt to auto zero with cal gas supplied to the monitor.**
2. Sensor response has changed due to settling or aging of the sensor. Solution: Press and hold the HOLD key during

final seconds of warm-up countdown in a fresh air environment.

## **For your safety**

### **Failure to AutoCal®**

May be caused by the following conditions:

1. Unacceptable calibration gas (type or concentration) or empty gas cylinder. Solution: Use the correct gas type, concentration and flow rate (see calibration instructions).
2. Sensor response has changed due to settling or aging of the sensor. Solution: Press and hold the HOLD key when instructed by the display for a manual calibration.
3. Sensor failure – sensor output is too low for AutoCal® or manual calibration to be successful. Solution: sensor must be replaced by competent technician or factory.

### **Calibrating the CGM II monitor**

A GfG Instrumentation calibration kit is required to calibrate the CGM II monitor. This kit includes a gas valve, tubing, calibration connector, and test gas appropriate to the sensors installed in your monitor. The calibration connector has a sliding switch that activates the calibration switch inside the instrument. The purpose of the sliding switch is to allow a test of the unit to confirm the gas levels without initiating a calibration. When the switch is in the “cal” position and placed over the sensor area, it will initiate AutoCal®. Assemble the components and using the captive screw, secure the calibration connector to the sensor bay. Be sure the calibration connector edges are fitted over the grill area and are firmly resting on the top of the case. Correct orientation places the switch in the lower right corner.

**Note:** The monitor must be warmed up for at least one hour before attempting calibration.

To calibrate, slide the switch to the "cal" position (far right). With the calibration connector in place, open the gas valve fully. The messages [AUTOCAL® FINISHED], [REMOVE GAS] will follow the countdown after successful calibration.

Failure to calibrate will cause one of two messages:

1. [(Sensor) NOT CALED] [SERVICE SENSOR] [PUSH HOLD] [TO ACKNOWLEDGE]. If this message appears, it indicates that the sensor is not responding adequately to gas (be sure the proper gas is flowing over the sensor). It is not possible to manually calibrate this sensor. It must be serviced. If you choose to continue with the calibration of the other sensors, press the HOLD key as instructed.

**WARNING: The user will not be protected by this sensor!**

2. [(Sensor) NOT CALED] [PUSH HOLD TO] [MANUALLY CAL]. If this message appears, it indicates the gain setting for this sensor will be adjusted beyond the error protected limit acceptable for an AutoCal®. (See error protected AutoCal®.) Pressing the HOLD key when instructed will allow the necessary adjustment to occur. This sensor will now be calibrated. Proceed with any additional instruction displayed by the monitor.

**CAUTION: Be sure you are using the correct calibration gas at 1.0 SCFH before disengaging the error protection with the HOLD key for a manual calibration.**

The CGM II's toxic sensor is calibrated with relatively inexpensive carbon monoxide for both CO and H<sub>2</sub>S readings.

The sensor detects both gases and has a fixed response ratio that allows the microprocessor to convert the CO readings into calibrated hydrogen sulfide readings. Five minutes after calibration the CGM II will initiate new TWA readings. The delay is to enable the calibration gas readings to return to zero.

### **Bump / test**

Slide the switch to the left (bump/test). While gas is flowing, note the gas readings; acceptable readings will be within a few percentage points of the calibration gas. If a sensor response is too weak, the unit will not calibrate. No response or low response when gas is applied in the bump/test mode, probably indicates a new sensor is required. (See maintenance section.)

### **Maintenance**

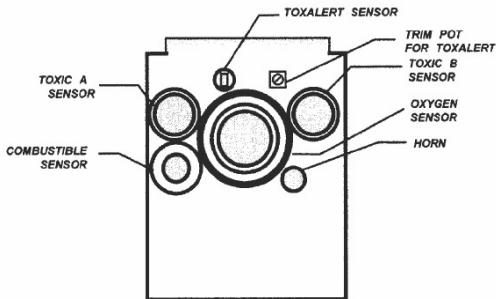
#### **Battery replacement**

The interchangeable battery pack plugs into the bottom circuit board and is replaced by unplugging and plugging in a new one.

Note: Date and Time must be reset. See set-up mode.

#### **Sensor replacement**

To change sensors refer to the drawing below to identify the sensors. Remove the two screws that secure the sensor access cover. Remove the Oxygen sensor prior to attempting removal of other sensors. Remove the combustible sensor to access toxic A.



**WARNING: Do not open the packaging of new sensors until you are ready to install them. Exposure to oxygen decreases shelf life. Do not press on the center portion of toxic or oxygen sensors. Damage may result.**

### **Oxygen sensor**

Unplug the oxygen sensor from the circuit board and plug in the new one. The sensor's pins are aligned so only one orientation is possible. Warm up the unit for one hour to stabilize the sensor. Then follow the procedure for disengaging the oxygen error protection by pressing the HOLD key for the last five seconds of the warm-up. The unit will be calibrated at 20.9% volume when the unit comes out of warm-up.

### **Toxic sensor replacement**

Unplug the sensor by pulling up on it. Be sure to remove the new sensor's **shorting wire** between its contacts. Plug in the new sensor and warm-up for one hour. The microprocessor will automatically detect and identify this new sensor

regardless of which of the two toxic sensor sockets are used. To auto zero the new sensor, turn the unit off and then back on. If the sensor fails to auto zero, repeat the warm-up, pressing and holding the HOLD button for the last five seconds. It will now require gas calibration.

## **Adding or substituting different toxic sensors**

The sensing capability of the CGM II may be changed at any time. Following is a list of toxic sensors that may be purchased and installed in the CGM II AutoCal®.

- Carbon monoxide            5704-018
- Hydrogen sulfide            5703-014
- DualTox                        5704-016

When changing or adding a sensor, turn the unit off, replace or add the sensor then turn the unit on. When turned on for the first time following a sensor change the monitor may display the following messages:

- Changing model #
- Warning – a sensor change has been made and calibration may be necessary

**Note:** Before purchasing a new sensor to reconfigure the monitor it is advisable to speak with a GfG technical representative to discuss the appropriate test gas and calibration procedure.

## **Combustible sensor**

Replace the old sensor by unplugging and replacing with the correct new sensor. Allow the sensors to warm up for one hour. Switch the unit Off and back On. The unit will auto zero and display the standard gas reading. A gas calibration is now required.

## **ToxAlert sensor**

The small sensor located at the top of the sensor enclosure is the ToxAlert sensor. Unplug and replace with a new sensor. Allow approximately one hour to stabilize, then turn the monitor off. Hold the "GfG" key down firmly while turning the unit back on. The counts screen will appear.



A small potentiometer is located next to the ToxAlert sensor on the sensor board. Using a non-metallic trimming tool, rotate this potentiometer until the number appearing on the screen next to the ToxAlert heading is approximately 3500 in clean air. The other numbers appearing on this screen are used by the factory for diagnosis and are not adjustable by the user.

**Note:** Do not apply calibration gas until a successful auto zero has occurred.

When calibrating a new sensor, manual calibration may be required. Follow the calibration directions (see "calibration") until prompted by the display at the end of the countdown to press the HOLD button, hold until the [AUTOCAL® FINISHED] [REMOVE GAS] message appears.

### **Reassemble**

When replacing the top cover, be sure that the sensors fit and the compartment is sealed. Replace the screws and turn the unit on. Follow the calibration instructions (see "calibration").

### **Start-up following a sensor change**

After replacing a sensor, the AutoCal® may not calibrate the unit because of the error protection programming. The error protection setting is based on a calibration value from the previous sensor and needs to be disabled when a new sensor is being installed.

To temporarily disengage the error protection to calibrate a new oxygen sensor and to zero new toxic or combustible sensors, push and hold the HOLD key when the warm-up

countdown shows five seconds and hold until the auto zero message appears. Release the HOLD key. The unit will zero and display a standard 20.9% Volume oxygen gas reading.

**Note:** Do not apply calibration gas until a successful Auto zero has occurred.

To temporarily disengage the error protection and manually calibrate a new combustible or toxic sensor, push and hold the HOLD key when prompted by the display and hold until the [AUTOCAL® FINISHED] [REMOVE GAS] message appears. Release the HOLD key and the unit will be calibrated. Error protection will automatically re-engage.

## **Glossary**

**% CH<sub>4</sub>:** The percentage by volume of combustible methane gas in an area. At 5% by volume the mixture of methane is at 100% LEL and will explode.

**% LEL:** A percentage of the lower explosion limit of a combustible gas (i.e., 20% LEL is 1/5 of the level of gas to have an explosion – also referred to as LFL)

**% VOLUME:** Percent volume (i.e., 20.9% V of oxygen is the standard percentage of oxygen by volume in air)

**CLEAN AIR:** An atmosphere which contains 0% LEL combustible, 20.9% volume oxygen, 0 ppm hydrogen sulfide, chlorine and sulfur dioxide, and less than 3 ppm carbon monoxide and 2 ppm total hydrocarbon

**COMBUSTIBLE GAS:** Any gas that will ignite or explode – measured in % LEL or % V CH<sub>4</sub>

**OXYGEN:** Percent of oxygen in the air – measured in % volume. Normal is 20.9% Vol.

**ppm:** Parts per million (i.e., 10 ppm H<sub>2</sub>S is 10 parts in a million parts of air)

**TOXIC GAS:** Any gas defined by the government as harmful to breathe – measured in ppm

**TWA:** Time weighted average or threshold limit value of a gas. The government has set levels at which toxic gas workers can be exposed over a period of time (i.e., a worker may be exposed to 200 ppm carbon monoxide peak for a short time, but can not exceed 35 ppm average over eight hours). 35 ppm is the TWA for carbon monoxide.

### **Replacement parts and accessories**

For assistance contact your distributor or GfG Instrumentation at 1 (800) 959-0329 or 1 (734) 769-0573.

### **Replacement parts**

<b>Part number</b>	<b>Description</b>
4002-260	Nickel metal hydride battery pack
4003-188	PC interconnect cable
4001-027	Battery charger
5501-014	ToxAlert sensor
5704-026	DualTox (CO/H <sub>2</sub> S) sensor
5701-014	Oxygen sensor
5705-015	Combustible sensor
7802-016	Test gas – 50% LEL methane and 200 ppm carbon monoxide

### **Accessories**

<b>Part number</b>	<b>Description</b>
1401-122	Soft case with belt loop

4001-028	12 VDC vehicle charger
4003-195	PC program and connector for downloading data
7773-001	Calibration kit with case (900, 902, 904)
7771-004	Mini-Pump (includes: wand, 25 ft. tubing, and filter)
7771-003	Hand aspirator attachment
9000-518	Carrying case includes space for calibration accessories
1401-126	Rubber Boot with Shoulder Strap

## **LIMITED LIFETIME WARRANTY**

GfG Instrumentation, Inc. warrants each new CGM 900 II product manufactured by it to be free from defective material and workmanship and that all such product is warranted as to its merchantability and fitness for the purpose intended, for life to the original purchaser, except as noted below, and agrees to remedy any such defect or to furnish a new part (at the Company's option) in exchange for any part of any product of its manufacture which under normal use, and service disclosed such defect; provided the product is delivered by the purchaser to GfG Instrumentation's factory, intact, for our examination, with all transportation prepaid to our factory, provided that such examination discloses, in our judgment, that it is defective.

Chemical toxic cells and chargers have a warranty for two (2) years. Oxygen cells have a warranty for twelve (12) months. Rechargeable batteries, electric pumps, key pads and combustible sensors have a one (1) year warranty. Consumable components such as filter screens are not warranted.

This warranty does not extend to any products which have been subjected to misuse, neglect, accident, unauthorized modifications, or to use in violation of instructions furnished by us, nor does it extend to products which have been repaired or altered outside of our factory. This warranty is in lieu of all warranties express or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our products. All implied warranties are limited to the duration of this written warranty. In no event is CfG Instrumentation, Inc. liable for special, incidental or consequential damages arising from any breach of warranty of product.

## **CAUTION**

Silicone compound vapors and lead compound vapors will cause desensitization of the combustible sensor resulting in low readings and measurements. Sensors should not be exposed to aerosol sprays, polishes, waxes and lubricants containing lead or silicones. If a combustible sensor has been exposed to these environments, the operation of the sensor should be verified by calibrating the instrument. If the combustible sensor cannot be calibrated the combustible sensor should be replaced. In environments where poisons cannot be eliminated, frequent bump testing is essential to ensure safe and accurate operation of the unit.







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