



ZGARD™ CX II

Programmable Controller Instruction Manual

WARNING

THIS MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR INSTALLING, USING OR SERVICING THIS PRODUCT. Like any piece of complex equipment, this product will perform as designed only if installed, used and serviced in accordance with the manufacturer's instructions. OTHERWISE, IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE PERSONAL INJURY OR DEATH.

The warranties made by Mine Safety Appliances Company with respect to these Products are voided if the products are not installed, used and serviced in accordance with the instructions in this user guide. Please protect yourself and others by following them. We encourage our customers to write or call regarding this equipment prior to use or for any additional information relative to use or repair.

Manuel d'instructions

Détecteur d'Émanations

Veillez lire attentivement les instructions qui suivent. Tous ceux qui sont responsables, ou qui aurons la responsabilité pour l'installation, la fonctionnalité ou l'usage de ce produit doivent se familiariser complètement avec ses instructions. Comme tout appareil complexifié, ce produit peut vous donner les résultats anticipés seulement s'il est installé, usagé et que le service d'entretien sont effectués d'après les instructions du fabricant (ou manufacturier). Sous peine de ne pas suivre les instructions ci-incluses, il est possible que cet appareil vous donne des résultats insuffisant. En conséquence, les personnes qui dépendront sur ce produit pour leur sécurité peuvent être blessés ou mourir.

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In North America., to contact your nearest stocking location, dial toll-free 1-800-MSA-INST

To contact MSA International, dial (724) 776-8626

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This manual is available on the internet at www.MSAsafety.com

Manufactured by

MSA NORTH AMERICA

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MSA Permanent Instrument Warranty

1. Warranty- Seller warrants that this product will be free from mechanical defect or faulty workmanship for a period of eighteen (18) months from date of shipment or one (1) year from installation, whichever occurs first, provided it is maintained and used in accordance with Seller's instructions and/or recommendations. This warranty does not apply to expendable or consumable parts whose normal life expectancy is less than one (1) year such as, but not limited to, non-rechargeable batteries, filament units, filter, lamps, fuses etc. The Seller shall be released from all obligations under this warranty in the event repairs or modifications are made by persons other than its own or authorized service personnel or if the warranty claim results from physical abuse or misuse of the product. No agent, employee or representative of the Seller has any authority to bind the Seller to any affirmation, representation or warranty concerning the product. Seller makes no warranty concerning components or accessories not manufactured by the Seller, but will pass on to the Purchaser all warranties of manufacturers of such components. **THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, AND IS STRICTLY LIMITED TO THE TERMS HEREOF. SELLER**

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General Warnings

NOTE

1. The ZGARD CX II Programmable Controller described in this manual must be installed, operated, and maintained in strict accordance with the labels, cautions, warnings, instructions, and within the limitations stated.
2. The ZGARD CX II Programmable Controller must not be installed in outdoor areas or in locations where explosive concentrations of combustible gases or vapors might occur in the atmosphere: Class 1, Group A, B, C, and D areas as defined by the NEC. Because the controller is not explosion-proof, it must be located in non-hazardous areas. Humidity 0-99% relative humidity, Pollution Degree 2, Installation Category II, Altitude 2000 meters max.
3. Do not paint the ZGARD CX II Programmable Controller and Do Not Expose To Direct Sunlight.
4. The only absolute method to assure the proper overall operation of a gas detection instrument is to check it with a known concentration of the gas for which it has been calibrated. Consequently, a calibration check must be included as part of the installation and as a routine inspection of the system.
5. Use only genuine MSA replacement parts when performing any maintenance procedures provided in this manual. Failure to do so may seriously impair instrument performance. Repair or alteration of the ZGARD CX II Programmable Controller, beyond the scope of these maintenance instructions or by anyone other than authorized MSA service personnel, could cause the product to fail to perform as designed, and persons who rely on this product for their safety could sustain serious personal injury or death.
6. The ZGARD CX II Programmable Controller must be installed, located and operated in accordance to all applicable codes. These codes include, but are not limited to, the National Fire Prevention Code and National Electric Code.
7. Do not exceed the relay contact ratings listed in this manual. Otherwise, the relay operation may fail, which can result in personal injury or death.
8. The ZGARD CX II Programmable Controller DOES NOT come pre-programmed with any sensor, relay or alarm setpoint parameters. These must be field-programmed and verified by trained and authorized personnel.

Failure to comply with the above warnings can result in serious personal injury or death.

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Section 1
ZGARD CX II Controller
General Information and Specifications

The ZGARD CX II Controller is an advanced microprocessor-based monitoring system designed to interface with remote gas sensors and perform user configured control functions for surveillance, activate ventilation equipment, personnel alert or alarm indication. The controllers feature audible and visual status indicators with relay outputs. The controller will automatically detect the total number and type of the remote sensors, actively residing on the RS485 network. Additional remote relay modules can also be tagged on the communication bus, creating a control and surveillance gas alarm monitoring system.

The ZGARD CX II Controller provides programmable operating parameters, which are organized by a menu interface with keypad and LCD screen. Standard features include a large LCD Screen, audible-visual indication and relay contact outputs. The remote gas sensors are connected via RS485 serial communication ports managed by the ZGARD CX II Controller; up to 99 sensors can be employed. The ZGARD CX II Controller acting as the host governs the digital RS485 serial communication and automatically coordinates the remote devices. MSA ZGARD S or GS sensor-transmitters are available to detect a wide variety of gases including Carbon Monoxide, Carbon Dioxide, Nitrogen Dioxide, Refrigerants and Ammonia.

OPERATING SPECIFICATIONS

Remote Sensor Input	RS485 digital data bus, 2-wire connection plus shield
Network Capacity	99 Remote Gas Sensors
Power Requirements	19-27 VAC, 50/60 Hz or 24-38 VDC, at 0.3 Amps 19-27 VAC, 50/60 Hz at 0.7 Amps (with STROBE OPTION) To be powered by a class 2 source
Operating Temperature	-20° to 50°C (-4° to 122°F)
Storage Temperature	-30° to 60°C (-22° to 140°F)
User Interface	Keypad on the front panel of the controller with menu driven operating parameters
Digital Display Screen	4 Line x 40 Character backlit LCD Screen displays the operating, alarm and fault diagnostic status of the system. The display is split in two display mode sections
Status Display	Common LED's for System OK-Green, Caution- Amber, Warning-Amber and Alarm-Red Power-Green, Fault-Red, Communication-Red & Green
Network Communication	RS485, 2-wire serial communication for remote gas sensors and auxiliary modules
Auto-Configuration Feature	Digitally recognized remote devices (Sensors and Auxiliary Modules). Each device residing on the RS485 serial data bus shall be automatically assigned as a Node on the network
Caution/Warning/Alarm Setpoints	Adjustable from 1 to 99% of operating range for each system sensor type
Number of Relays	4 assignable DPDT Relays: Relay1, Relay2, Relay3 & Relay4
Remote Relay Modules (RRM)	Up to 8 OPTIONAL RRM'S can be connected to the controller. Each relay module adds 4 assignable DPDT relay outputs. These relays are freely assignable from within the CX II configuration menu
Relay Contacts Rating	5 Amps , 250Vac. 5 Amps, 30Vdc.
Relay Action	A Caution, Warning & Alarm relay can be defined as Normally Energized or De-Energized and Latching or Non-Latching. A Fault relay is always normally-energized and non-latching.
Relay Time Delays	Menu selected OFF delays, adjustable from 0 to 600 seconds for Caution, Warning and Alarm, effectively common to all active channels
Event Logging	Event logging of every status change with time & date stamp. Events are stored in non-volatile memory and can be viewed on LCD Screen or sent to printer via RS-232 port. Up to 20,000 events can be stored. Most recent events over-write oldest events.
Serial Interface	MODBUS interface allows retrieval of system status including individual sensor data Optional BACnet module allows for integration into BACnet systems
Set-up and Calibration	Pre-configured at factory to default settings and configurable by user
Audible Alarm	Audible Alarm Device, 93 dB @ 0.3 meters
Pushbutton	Alarm Silence feature
Enclosure	Polycarbonate, Water- and corrosion-resistant enclosure
Dimensions	7" (117 mm) H x 10" (254 mm) W x 3.75" (95 mm) D
Weight	3kg (6 lbs.)
Certification	UL / CSA 61010-1-2012 File No. 3118354

Section 2

ZGARD CX II Controller Installation Guidelines

The performance of ZGARD CX II Controller is also dependent on the appropriate employment of the associated remote gas sensors. The remote gas sensors should be strategically placed closest to the areas where the target gases or vapors might occur in the atmosphere. Follow the recommended guidelines listed below.

Mounting:

- Do not mount the controller to structures subject to vibration and shock, such as piping and piping supports.
- Do not locate the controller near excessive heat source or in wet and damp locations.
- For proper cooling, allow at least five inches of clearance around all surfaces except for the mounting surface. Also consider mounting the controller so it can be easily accessed for service and routine testing.
- Make sure the controller is not blocked; otherwise front panel lights and controls will be obscured from view.
- The controller has four mounting lugs; securely mount the instrument to a wall or support using appropriate hardware.

Wiring Connections:

Before putting a ZGARD CX II Controller into operation, determine the capacity, designation and number of remote gas sensors, and configure the controller according to the required application. Also refer to the ZGARD CX II controller Installation Outline drawing located in the back of this manual, which provides important information regarding;

- Operating power.
- Number and type of remote sensors.
- Required conductors and wire size.
- Relay wiring connection.

NOTE

1. When wiring the controller, disconnect the main power to prevent bodily harm.
2. Do not use the controller power when connecting any external devices to the relay contacts.
3. Use shielded cable for wiring installation. Do not install low voltage signal cable in the same conduit as the controller's operating power and or relay wiring.
4. Do not exceed the contact ratings marked on the relays.
5. Make sure that each sensor is given a unique address (Jumper selected), or the ZGARD CX II Controller may not be able to communicate appropriately.
6. When connecting the remote sensors, make sure that all wiring is correct and the two leads of the RS485 bus are not interchanged, or permanent damage to the sensor may result.
7. Perform all wiring and conduit installation in accordance to the National Electrical Code.

Failure to follow the above cautions can result in injury or property damage.

Section 3
ZGARD CX II Controller
Factory Setup Configuration

Number of Remote Sensors	99 Sensors detected the by Auto-Configuration feature
Operating Range	0 - 9999 (Auto-Ranging)
Caution Level	25% FS
Warning Level	35% FS
Alarm Level	50% FS
Relay Assignment	
K1 user adjustable	Assigned to Zone 1 (default, user adjustable)
K2 user adjustable	Assigned to Zone 1 (default, user adjustable)
K3 user adjustable	Assigned to Zone 1 (default, user adjustable)
K4 user adjustable	Assigned to Zone 1 (default, user adjustable)
Relay Mode	K1, K2, K3, K4 Programmable: Latching or Non-Latching, Energized or De-Energized
ON Time Delays	Set to 10 seconds for Caution, Warning & Alarm; common to all zones

Optional Remote Relay Modules (RRM): Each optional Remote Relay Module (RRM) provides 4 freely assignable DPDT relays. These can be assigned to any event (Caution, Warning, Alarm or Fail) and for any zone. Each RRM is connected on the RS485 network and can reside anywhere on the data bus, up to 1,500 meters away from the controller. The ZGARD CX II Controller does NOT provide operating power for the Remote Relay Modules.

REMOTE RELAY MODULE SPECIFICATIONS

Operating Power	17-27VAC, 50/60 Hz or 24-38 VDC at 0.3 Amps, power provided from external source 17-27 VAC, 50/60 Hz at 0.7 Amps (with STROBE OPTION) To be powered by a class 2 source
Network Communication	RS485, 2-wire serial communication
Temperature	Operating: -20° to 50°C (-4° to 122°F) Storage: -30° to 60°C (-22° to 140°F)
Relay Action	Each RRM adds 4 DPDT relays that can be assigned from within the CX II configuration menu.
Relay Contacts Rating	5 Amps, 250Vac. 5 Amps, 30Vdc.
Enclosure	Polycarbonate, Water- and corrosion-resistant enclosure
Dimensions	11.5" (292 mm) H x 9.5" (241 mm) W x 4.75" (121 mm) D
Certification	UL / CSA 61010-1-2012 File No. 3118354

Section 4

ZGARD CX II Controller

Operation and Features

Note: The ZGARD CX II Programmable Controller DOES NOT come pre-programmed with any sensor, relay or alarm setpoint parameters. These must be field-programmed and verified by trained and authorized personnel.

Auto Configuration: The ZGARD CX II Controller will automatically recognize the number of remote gas sensors that are compliant with the system. The first screen on the configuration setup menu prompts the user to decide if the Auto-Configuration program should be executed. There are 3 options to choose from. The Full Configuration... finds sensors and sets all parameters to defaults including relay assignments. The Add Sensors... finds new sensors beyond the last active sensor in the system. The Change Sensors... compares the gas identification codes of all active sensors and reconfigures the sensors with the new association. When either option is chosen, the controller will start searching for the remote gas sensors residing on the RS485 data bus network and organizes the system accordingly.

Programmable Configuration: The Keypad on the front panel permits the user to program the controller for customized applications. To prevent unauthorized access, an entry code must be entered before the configuration mode is offered.

Remote Sensors: The controller is designed to host a series of MSA ZGARD S or GS gas sensors with RS485 digital output. These sensors are supported on a 2-wire data bus (network). Each sensor facilitates Address Jumpers used to assign a digital address code.

Caution Condition: If the gas level measured at any of the remote sensors or group of sensors exceeds a predetermined caution threshold, then the common Caution LED located above the LCD

Screen will indicate a caution event. Relay outputs can be pre-assigned to activate on the caution level.

Warning Condition: If the gas level measured at any of the remote sensors or group of sensors exceeds a predetermined warning threshold, then the common Warning LED located above the LCD Screen will indicate a warning event. Relay outputs can be pre-assigned to activate on the Warning level.

Alarm Condition: If the gas level measured at any of the remote sensors or group of sensors exceeds a predetermined alarm threshold, then the common Alarm LED located above the LCD Screen will indicate an alarm event. The audible alarm will also sound at this time, pressing the reset button during an Alarm event will silence the audible device. If a new Alarm should occur while the gas controller is already in an Alarm condition, the audible alarm will sound again; repeatedly pressing the reset button can silence it. Relay outputs can be pre-assigned to activate on the Alarm level.

Relay Mode: Each programmable relay can be configured to operate in the normally de-energized or normally energized, latching or non-latching mode and an OFF Delay.

System Diagnostics Feature: If any active remote device should fail to communicate on the RS485 network, the System OK LED will turn OFF, the FAULT LED will turn ON and the fail relay will deactivate. Subject to a communication failure, the Warning LED will also turn ON and the warning relays will be activated. Considering that the warning level of a gas controller system is typically used as the ventilation index, this feature is provided as a fail-safe measure to ensure the surveillance-affected area is ventilated.

Section 5
**ZGARD CX II Controller
Programmable Alarm Relays Operation**

Note: The ZGARD CX II Programmable Controller DOES NOT come pre-programmed with any sensor, relay or alarm setpoint parameters. These must be field-programmed and verified by trained and authorized personnel.

Alarm and Control: There are two basic operating schemes that can be set up by the controller. The options described below can be selected by the user interface keypad located on the front panel.

Default Mode: The program memory of the ZGARD CX II controller retains the identification codes for MSA ZGARD S and GS gas sensors listed. Each sensor type and operating range includes pre-selected caution, warning and alarm thresholds. For instance, if the ZGARD CX II controller identifies ZGARD S and GS Carbon Monoxide sensor, then the option of using the internal codes is available. This feature will accept the residing threshold of 25ppm (Caution), 35ppm (Warning) and 50ppm (Alarm), and will be used to determine the alarm status commands reported by the controller during operation.

Custom Mode: The ZGARD CX II controller can be programmed with custom threshold settings. This option will bypass the internal digital identification code of a ZGARD S and GS sensor. The Caution, Warning and Alarm thresholds can be set to any value from 1% to 99% of the operating range (Full Scale) for each individual system sensor.

Zone Feature: A group of remote sensors can be assigned to one of 8 Zones by the user. The ZGARD CX II controller can then execute control functions based on each zone. By adding optional Remote Relay Modules (RRM's) distributed control can be achieved in addition to the internal control via the relays inside the ZGARD CX II.

Event Logging Feature: The ZGARD CX II controller retains all status change events in non-volatile memory. A status change event can be any point going from OK to any alarm state, from one alarm state to another alarm state or from any alarm state to OK. All events have a time and date stamp associated with them. Events may be reviewed from the LCD Screen or sent to a PC or printer via the RS-232 port. **Refer to the DATA LOGGING OPERATION in Section 6 for further details.**

Relay Outputs: The controller provides a standard compliment of 4 common relay outputs; each one configurable to be Caution, Warning., Alarm or Fault. Additional remote relay modules may be added anywhere on the RS-485 bus to provide more intricate local control. Relays only activate if the sensors in their zone exceed the programmed threshold levels.

Relay Modes: Relays set to function as normally de-energized are inactive under normal condition, and will be activated during a threshold breach. The normally energized function forces a relay to be powered ON during normal conditions and will de-activate during a threshold breach. This feature is known as a fail-safe operation. When a relay is activated, the LED located beside it will be turned ON. Relays set to the latching function will lock ON after a threshold breach. The reset button must be pressed after each condition has cleared in order to de-activate the relays.

Delay Feature: The Caution, Warning and Alarm relays can be set with an OFF delay between 0 to 600 seconds. The OFF delay is common to all of the gas sensors linked to the controller.

Section 6
ZGARD CX II Controller
Serial I/O Feature & Operation

The ZGARD CX II controller is capable of communicating to an external control or monitoring system using either BACnet MS/TP or MODBUS. The MODBUS protocol is inherent to the CX-II controller while the BACnet MS/TP protocol requires a plug-in board. This plug-in board may come installed from the factory depending on which model was ordered. Both protocols utilize RS-485 as their bus topology. RS-485 Port #4 on the main board is used for either MODBUS or BACnet.

Selection Jumpers: There are four jumpers on the controller's display board that must be set correctly depending on the type of Serial I/O being used. The jumpers are marked JP1 A,B,C,D.

Serial I/O Type	JP1 A,B,C,D
MODBUS	All 4 Jumpers IN
BACnet	All 4 Jumpers OUT

MODBUS: All MODBUS registers are read-only and are intended for remote monitoring purposes only. Writing to a register is not permitted. Only MODBUS function 03 (Read Holding Register 4xxxx) is supported with a maximum of 60 registers per read.

MODBUS Register Table:

- 40000 – 40009: Sensor 1
- 40010 – 40019: Sensor 2
- 40020 – 40029: Sensor 3
- Etc...
- 40980 – 40989: Sensor 99

- 41100 – 41104: Zone 1
- 41105 – 41109: Zone 2
- Etc...
- 41135 – 41139: Zone 8

- 42000: Relay 1
- 42001: Relay 2
- Etc...
- 42039: Relay 40

The following data is available for each **SENSOR**:

- 40xx0: Enable State/Gas ID
(0=Disabled, 1...99=GasID)
- 40xx1: Status
(0=OK, 1=Fail, 2=Caution, 4=Warning, 8=Alarm)
- 40xx2: Zone Assignment (1...8)
- 40xx3: Sensor Port (1...4)
- 40xx4: Sensor Range (0...65535)
- 40xx5: Sensor Gas Value (0...65535)
- 40xx6: Caution Setpoint (0...65535)
- 40xx7: Warning Setpoint (0...65535)
- 40xx8: Alarm Setpoint (0...65535)
- 40xx9: Not Used

The following data is available for each **ZONE**:

- 411x0/x5: High Select Value (0-100%FS)
- 411x1/x6: Status
(0=OK, 1=Fail, 2=Caution, 4=Warning, 8=Alarm)
- 411x2/x7: No. Sensors (0..99)
- 411x3/x8: Not Used
- 411x4/x9: Not Used

The following data is available for each **RELAY**:

- 420xx: Status (0=De-Activated,1=Activated)

MODBUS Type & Framing: Both ASCII and RTU types of MODBUS are supported by the CX-II controller. The type is selectable in the configuration menu. The framing is slightly different for the two types:

- MODBUS ASCII: 7 Data, 1 Stop, Even Parity
- MODBUS RTU: 8 Data, 1 Stop, No Parity

MODBUS Baud Rate: The MODBUS baud rate is selectable from the configuration menu. Available choices are: 9600, 19200 and 38400 baud.

MODBUS Address: The MODBUS slave address is selectable from 1-9 in the configuration menu as well.

Section 6
ZGARD CX II Controller
Serial I/O Feature & Operation

BACnet: All BACnet registers are read-only and are intended for remote monitoring purposes only. Writing to a register is not permitted.

BACnet Object Table:

Analog:

- 1 – 99: Gas Value, Sensor 1 – 99
- 101 – 199: Gas Range, Sensor 1 – 99
- 201 – 299: Caution Setpoint, Sensor 1 – 99
- 301 – 399: Warning Setpoint, Sensor 1 – 99
- 401 – 499: Alarm Setpoint, Sensor 1 – 99
- 501 – 508: High Select, Zone 1 – 8
- 511 – 518: No. Sensors, Zone 1 – 8

Multi-State:

- 101 – 199: Alarm State, Sensor 1 – 99
- 201 – 299: Zone Assignment, Sensor 1 – 99
- 301 – 399: RS-485 Port, Sensor 1 – 99
- 401 – 499: GasID, Sensor 1 – 99

Binary:

- 1 – 40: Relay Status, Relay 1 – 99

BACnet Baud Rate: The BACnet baud rate is selectable via DIP switches on the BACnet plug-in board.

DIP switches 6 & 7 are used to set the baud rate:

SW1-6	SW1-7	Baud Rate
OFF	OFF	19200
ON	OFF	38400
OFF	ON	115200
ON	ON	Restore factory defaults

BACnet MAC Address: The BACnet slave address is selectable via DIP switches on the BACnet plug-in board.

DIP switches 1 through 4 are used to set the BACnet MAC address:

1	2	3	4	5	MAC	1	2	3	4	5	MAC
0	0	0	0	0	0	0	0	0	0	1	16
1	0	0	0	0	1	1	0	0	0	1	17
0	1	0	0	0	2	0	1	0	0	1	18
1	1	0	0	0	3	1	1	0	0	1	19
0	0	1	0	0	4	0	0	1	0	1	20
1	0	1	0	0	5	1	0	1	0	1	21
0	1	1	0	0	6	0	1	1	0	1	22
1	1	1	0	0	7	1	1	1	0	1	23
0	0	0	1	0	8	0	0	0	1	1	24
1	0	0	1	0	9	1	0	0	1	1	25
0	1	0	1	0	10	0	1	0	1	1	26
1	1	0	1	0	11	1	1	0	1	1	27
0	0	1	1	0	12	0	0	1	1	1	28
1	0	1	1	0	13	1	0	1	1	1	29
0	1	1	1	0	14	0	1	1	1	1	30
1	1	1	1	0	15	1	1	1	1	1	31

Note: DIP Switch 8 on the BACnet interface board must always be in the OFF position for normal operation. This switch is reserved for factory purposes only.

Section 7

ZGARD CX II Controller

Event Logging Feature & Operation

The ZGARD CX II controller automatically retains a record of every status change event in its non-volatile memory. The events stored in this memory will be retained indefinitely even when the ZGARD CX II is powered down. There is no battery required for this feature. Up to 1,250 events can be stored before the oldest one will be over written with the newest event.

A status change event can be any one of the following:

1. A remote sensor goes from OK to Caution, Warning or Alarm or Fail
2. A remote sensor goes from Caution, Warning or Alarm or Fail to OK
3. A remote sensor goes from any alarm state to another alarm state

When a status change event occurs, the ZGARD CX II records the time and date the event occurred as well as the sensor point number (address), gas type and actual gas level that caused the event.

A special Event Review function allows the user to retrieve past status change events from the LCD Screen. It also allows all retained events to be sent to a printer via the RS-232 port on the ZGARD CX II.

Example: Sensor no. 12 changed its status from WARNING to ALARM at 8:15:33 on 19 April 2008. The gas level at the time of the event was 72ppm CO.

```

EVENT :      SENSOR : 12 STATUS :  WARN . >  ALARM
ZONE :      1    GAS LEVEL :      72 PPM CO
TIME :      08 : 15 : 33   APR 19 , 2008
< , > : PRV / NXT   RUN : EXIT   FILE : 1 : CSV 2 : TXT
  
```

Send All Events: While in Event Review mode, pressing the '1' or '2' allows all stored events to be sent to an attached PC or printer via the RS-232 port on the ZGARD CX II. Option '1' sends all events in a CSV file format that can be opened with Microsoft Excel®, whereas option '2' is more easily human-readable and can be used for printing.

Printing Current Status: While in Event Review mode, pressing the STATS key will generate a

report of the status of every point on the ZGARD CX II along with the gas level and type. This report will be sent to a PC or printer via the RS-232 port on the ZGARD CX II. A time stamp is also included on the report.

Event Log Access: To access all event logging features, the ZGARD CX II must be placed into its event log mode by pressing the **EVENT LOG** button. During this mode, the ZGARD CX II does not scan the remote sensors and does not activate any warning or alarm relays. An automatic timeout returns the ZGARD CX II to normal operation if no keypad activity is detected for 1 minute while in this mode.

Event Display: The LCD Screen shows each event in chronological order, starting with the most recent one first. To step through all stored events, use the '←' button for the previous event and the '→' button for the next event. A typical event is displayed below. In this example, sensor point no. 12 changed its status from WARNING to ALARM at 8:15:33 on 19 April 2008. The gas level at the time of the event was 72ppm CO.

Exit Event Review: To exit Event Review mode immediately without waiting for the 1 minute inactivity timeout, press the RUN key.

Section 8
ZGARD CX II Controller
LCD Screen Display Feature

Once the ZGARD CX II controller is powered ON, it will execute a 60 second start-up routine. The text on the display screen should read:

ZGARD CX II
INTELLIGENT GAS MONITORING SYSTEM

INITIALIZING ... PLEASE WAIT

HOME Screen: The LCD is split into two sections separated by a column of "|". The **left side of the screen** exhibits the status of all of the active channels. The text message OK will be shown during normal operation. For visualisation, the screen is sequentially updated every 2 seconds.

1 :	1 0 P P M C O	O K	R G :	1 0 0 P P M
C :			Z O N E	# S N S S T A T U S
W :			1	5 O K
A :			2	1 1 O K

Line1: Starting with the first active channel, the display reports the gas level and the concentration symbol, ppm (part per million) as an example. The **OK** status condition is displayed when the current polled sensor is not in an alarm condition. Following is the **RG** descriptor which identifies the operating range of the current sensor being polled. The range and the sensor type are sequentially revealed on every update.

Column1-Line 2: Displays the descriptor **C**, which is the symbol for "Caution". If one or more sensors breach their respective caution level, then the sensor numbers will be displayed adjacent to the C descriptor. Should the number of sensors in a caution condition exceed the physical space provided, then a "+" sign will be displayed at the end of the line.

Column1-Line 3: Displays the descriptor **W**, which is the symbol for "Warning". If one or more sensors breach their respective warning level, then the sensor numbers will be displayed adjacent to the W descriptor. Should the number of sensors in a warning condition exceed the physical space provided, then a "+" sign will be displayed at the end of the line.

Column1-Line 4: Displays the descriptor **A**, which is the symbol for "Alarm". If one or more sensors breach their respective alarm level, then the sensor numbers will be displayed adjacent to the A descriptor. Should the number of sensors in a alarm condition exceed the physical space provided, then a "+" sign will be displayed at the end of the line.

FAIL Status: Line 2 is also utilized by a second function. If any of the sensors fail to operate, then a fault condition will occur. As the suspect sensor is polled, line 1 will display the text message "FAIL". During this event the "Fault" LED will turn ON and the system will go into WARNING for that sensor and any associated zone(s). This line will now toggle between displaying CAUTION sensors and FAIL sensors. It will toggle at about a 2 second rate. A multi sensor failure occurrence will continue to fill in the line right of the **F** descriptor. Should the number of sensors exceed the physical space of the line provided, then a "+" sign will be displayed at the end of the line.

Example: The display screen shown below is reporting that sensors 2 and 7 in Zone 1 are in a fail condition and the controller is currently polling sensor 2, exhibiting an INVALID TYPE status.

2 :	3 5 P P M C O	F A I L	R G :	1 0 0 P P M
F :	2 7		Z O N E	# S N S S T A T U S
W :			1	5 W A R N
A :			2	1 1 O K

Section 8

ZGARD CX II Controller

LCD Screen Display Feature

The **right side of the LCD Screen** displays the Zone, #SNS and the Status of each zone (group of remote sensors) and is sequentially updated every 2 seconds.

Column1: The term **ZONE** reports the zone numbers.

Column2: The term **#SNS** reports the number of sensors allocated to the current Zone.

Column3: The term **STATUS** reports and updates the condition of each zone. The symbol OK, Warn or Alarm may appear depending on the conditional events in each zone.

Example: ZGARD CX II Home Screen.

1 :	10	PPM	CO	OK	RG :	100	PPM
C :					ZONE	#SNS	STATUS
W :					1	5	OK
A :					2	11	OK

Example: ZGARD CX II **STATUS** Display Screen. Shown below is an example of Zone 1 in Warning and Zone 3 in an Alarm condition.

1 :	35	PPM	CO	WARN.	RG :	100	PPM
C :				1	ZONE	#SNS	STATUS
W :	1	2		2	1	5	WARN.
A :	9			3	2	11	OK

19 :	60	PPM	CO	ALARM	RG :	100	PPM
RG :	100	CO		1	ZONE	#SNS	STATUS
W :	1	2		2	2	11	OK
A :	9			3	3	4	ALARM

8.1

Section 8
ZGARD CX II Controller
LCD Screen Display Feature

Using the examples below, the screen simulations demonstrate the following displays: A ZGARD CX II has been configured with: 2 Zones, 4 Sensors per Zone, all Sensors are 100ppm CO type; Caution at 25ppm, Warning at 35ppm and Alarm at 50ppm.

1. System OK

1 :	10	PPM	CO	OK	RG :	100	PPM
C :					ZONE	#SNS	STATUS
W :					1	4	OK
A :					2	4	OK

2. Sensor 1=40ppm (warning), Zone 1 → WARNING because one or more sensors in zone 1 are in warning. Common Caution & Warning Relays activate; optional zone 1 Caution & Warning relays activate if ZRM is present for zone 1.

1 :	40 PPM CO	W A R N .	R G :	100 PPM
C :			Z O N E	# S N S S T A T U S
W :	1		1	4 W A R N .
A :			2	4 O K

3. Sensor 1=40ppm (warning), 5=45ppm (warning), Zone 1 & 2 → WARNING because 1 sensor in each zone is in warning. Common Caution & Warning Relays activate; optional zone 1 Caution & Warning relays activate if ZRM is present for zone 1 and zone 2 Caution & Warning relays activate if ZRM is present for zone 2.

1 :	40 PPM CO	W A R N .	R G :	100 PPM
C :			Z O N E	# S N S S T A T U S
W :			1	4 W A R N .
A :			2	4 W A R N .

4. Sensor 1=60ppm (alarm), 2=45ppm (warning), Zone 1 → ALARM because one or more sensors in zone 1 are in alarm, and the common Caution, Warning & Alarm relays activate. Optional zone 1 Caution & Warning & Alarm relays activate if ZRM is present for zone 1 and zone 2 Caution & Warning relays activate if ZRM is present for zone 2.

1 :	60 PPM CO	A L A R M	R G :	100 PPM
C :			Z O N E	# S N S S T A T U S
W :			1	4 A L A R M
A :			2	4 W A R N .

5. Sensor 2 Failed, Zone 1 → WARNING because one sensor has failed (failed sensor is forced into warning). common Caution & Warning relays activate.

1 :	35 PPM CO	F A I L	R G :	100 PPM
C :			Z O N E	# S N S S T A T U S
W :			1	4 W A R N .
A :			2	4 O K

Section 9
ZGARD CX II Controller
Operation & Configuration Set Up Menu

1	2	3	MENU
4	5	6	RUN
7	8	9	STATS
<	0	>	ENTER

Before the ZGARD CX II controller is ready to function, all of the operating parameters must be configured. The Keypad on the front panel provides the user to interface with the set-up Menu. To advance to any specific menu item keep pressing the MENU key repeatedly until the desired menu screen appears. The Keypad shown here is representative of the device mounted on the front panel.

NOTE

During configuration, the controller will NOT supervise any sensor inputs. All relay actions are arrested and will NOT activate or deactivate even if the gas level at any of the system sensors should change.

TIME OUTS: In the absence of keypad activity, an automatic time-out will return the ZGARD CX II controller to the RUN mode and then back to the Home Screen after 5 minutes. Similarly, during the Calibration Mode, the time-out is 30 minutes.

1. Press the MENU key. The controller will prompt the user to enter an access code.
2. Type in the access code followed by the ENTER key. The default access code is '0' which should be changed for security. See item 37.

```

SYSTEM CONFIGURATION
ENTER ACCESS CODE

```

3. Press the MENU key.
4. The **AUTO-CONFIG** menu will appear. The second line of the display shows the current setting NO, which is the default setting. The third line implies the programmer to change the setting. There are 3 options for the auto configuration program.

```

AUTO - CONFIG : NO
< , > : CHANGE                ENTER : ACCEPT

```

Option 1: The user may proceed with a **FULL CONFIGURATION**. This option will automatically configure the remote sensors that are appropriately connected to the system and assign them all to Zone 1. This is a default provision. The user may accept all of the found sensors already pre-assigned to Zone 1 followed by the verification of the Warning and Alarm set points. Once that has been completed, the sensors can be appointed to other zones and relay assignments depending on the required application.

Option 2: The user may **ADD SENSORS** to the system. This option allows the user to increase the number of sensors already on the system. However, this may only be conducted if the system has previously been auto-configured. This option will automatically assign all additional remote sensors to Zone 1 followed by the verification of the Warning and Alarm set points. The user may accept all of the newly found sensors pre-assigned to Zone 1 or may appoint to other zones and relay assignments depending on the required application.

Option 3: The **CHANGE SENSORS** option allows the user to modify any of the sensors that already exist on the system. The system will verify and change the sensor **TYPE & RANGE**. The user will be asked to verify the Warning and Alarm set points.

Section 9
ZGARD CX II Controller
Operation & Configuration Set Up Menu

5. Press the → key.

5.1. **Full auto configuration:** The user may proceed with a full configuration.

```
AUTO - CONFIG : FULL CONFIGURATION
FIND & ASSIGN ALL SENSORS TO ZONE 1
< , > : CHANGE                               ENTER : ACCEPT
```

The screen below will appear as the remote sensors are found and verified. The example below demonstrates a system being configured with 24 remote sensors.

```
AUTO - CONFIG : SCANNING . . .
1 2 3 4 5 6 7 8 9 10 11 12 13
< , > : CHANGE                               ENTER : ACCEPT
```

Should the system find more than the second line can facilitate, the scanning sequence will continue to fill in as they are found.

```
AUTO - CONFIG : SCANNING . . .
14 15 16 17 18 19 20 21 22 23 24
< , > : CHANGE                               ENTER : ACCEPT
```

5.2. The user may accept all of the found sensors already pre-assigned to Zone 1 and then will be asked to verify the Warning and Alarm set points. Press the menu key to accept and continue.

```
AUTO - CONFIG : 24 SENSORS FOUND
14 15 16 17 18 19 20 21 22 23 24
>>> VERIFY WARNING & ALARM SETPOINTS <<<
MENU : CONTINUE
```

6. Press the → key.

6.1. **Add sensors auto-configuration:** The user may proceed to add sensors to the system.

```
AUTO - CONFIG : ADD SENSORS
FIND & ASSIGN NEW SENSORS TO ZONE 1
< , > : CHANGE                               ENTER : ACCEPT
```

6.2. The screen below will appear and report the number of new sensors that have been found. The user will be asked to verify the Warning and Alarm set points. Press the menu key to accept and continue.

```
AUTO - CONFIG : 3 SENSORS FOUND
25 26 27
>>> VERIFY WARNING & ALARM SETPOINTS <<<
MENU : CONTINUE
```

7. Press the → key.

7.1. **Change sensors auto configuration:** The user may now change the type and range for any existing sensors on the system.

```
AUTO - CONFIG : CHANGE SENSORS
VERIFY & CHANGE SENSOR TYPE & RANGE
< , > : CHANGE                               ENTER : ACCEPT
```

Section 9
ZGARD CX II Controller
Operation & Configuration Set Up Menu

7.2. The screen example below will appear and report that sensor 24 has been changed. The user will be asked to verify the Warning and Alarm set points. Press the menu key to accept and continue.

```
AUTO - CONFIG : SCANNING . . .
 24
>>> VERIFY WARNING & ALARM SETPOINTS <<<
MENU : CONTINUE
```

8. Press the MENU key.

9. The **CAUTION SETPOINT** menu will appear. The second line of the display shows the current sensor # to be assigned a caution set-point level. The sensor range is also shown for reference only. The third line shows the gas type and current set point. The following choices are available:

9.1. **Change set point:** Type the new caution set point (cannot exceed the RANGE value shown) and press ENTER.

9.2. **Go to next sensor #:** Press the ← or → key to move through all of the sensor numbers.

```
CAUTION SETPOINT
  SENSOR # : 1 RANGE : 100 PPM
  SETPOINT : 25 PPM GAS : CO
< , > : SENSOR 0 . . 9 : VALUE ENTER : ACCEPT
```

10. Press the MENU key.

11. The **WARNING SETPOINT** menu will appear. The second line of the display shows the current sensor # to be assigned a warning set-point level. The sensor range is also shown for reference only. The third line shows the gas type and current set point. The following choices are available:

11.1. **Change set point:** Type the new warning set point (cannot exceed the RANGE value shown) and press ENTER.

11.2. **Go to next sensor #:** Press the ← or → key to move through all of the sensor numbers.

```
WARNING SETPOINT
  SENSOR # : 1 RANGE : 100 PPM
  SETPOINT : 25 PPM GAS : CO
< , > : SENSOR 0 . . 9 : VALUE ENTER : ACCEPT
```

12. Press the MENU key.

13. The **ALARM SETPOINT** menu will appear. The second line of the display shows the current sensor # to be assigned an alarm set-point level. The sensor range is also shown for reference only. The third line shows the gas type and current set point. The following choices are available:

13.1. **Change set point:** Type the new alarm set point (cannot exceed the RANGE value shown) and press ENTER.

13.2. **Go to next sensor #:** Press the ← or → key to move through all of the sensor numbers.

```
ALARM SETPOINT
  SENSOR # : 1 RANGE : 100 PPM
  SETPOINT : 50 PPM GAS : CO
< , > : SENSOR 0 . . 9 : VALUE ENTER : ACCEPT
```

Section 9
ZGARD CX II Controller
Operation & Configuration Set Up Menu

14. Press the MENU key.

15. The **ZONE ASSIGNMENT** menu will appear. The second line of the display shows the current sensor # to be assigned with the corresponding zone number. The following choices are available:

15.1. **Change sensor #:** Press the ← or → key to associate the sensor # with the zone #.

15.2. **Change zone #:** Type the new zone (1 to 8) number and press ENTER to accept.

```

Z O N E   A S S I G N M E N T
      S E N S O R :      1           Z O N E :      1
< , > : S E N S O R      1 . . 8 : Z O N E           E N T E R : A C C E P T
```

16. Press the MENU key.

17. The **EXTERNAL RELAY CARDS** menu will appear. The second line of the display shows the current selection of active external relay cards. Relay card 0 is the internal relay card and is always shown. If other relay cards are connected to the system, their address (1-9) determines their location in the relay map.

17.1. Press the ← or → key to initiate a scan of all external relay card addresses

```

E X T E R N A L   R E L A Y   C A R D S
      A C T I V E :      0      1
< , > : R E - S C A N                               E N T E R : U P D A T E
```

17.2. As the ZGARD CX II scans for external relay cards, it displays all cards that are found

```

E X T E R N A L   R E L A Y   C A R D S
      A C T I V E :      0      1
      F O U N D :      0      1      2
< , > : R E - S C A N                               E N T E R : U P D A T E
```

17.3. Press ENTER to accept all found relay cards. Any newly found relay cards will not be available to the system until ENTER is pressed to update the ZGARD CX-II

18. Press the MENU key.

The **FAULT RELAY ASSIGNMENT** menu will appear. The second line of the display shows the current relay number (1-40) and its network location (internal or external card and relay number on that card). The third line shows the zone(s) to which this FAULT relay is assigned. A relay may be assigned to multiple zones.

18.1. Press the ← or → key to move through all of the relay numbers.

18.2. Press 1 through 8 to add or delete a zone that this FAULT relay is supposed to get activated for

18.3. If a relay number is not present because its external card is not found on the network, the message RELAY NOT AVAILABLE will be displayed on line 3.

```

F A U L T   R E L A Y   A S S I G N M E N T
      R E L A Y :      1   ( I N T E R N A L   R E L A Y :      1 )
      Z O N E :      1     2
< , > : R E L A Y                               1 . . 8 : T O G G L E   Z O N E
```

Section 9
ZGARD CX II Controller
Operation & Configuration Set Up Menu

19. Press the MENU key.

The **CAUTION RELAY ASSIGNMENT** menu will appear. The second line of the display shows the current relay number (1-40) and its network location (internal or external card and relay number on that card). The third line shows the zone(s) to which this CAUTION relay is assigned. A relay may be assigned to multiple zones.

19.1. Press the ← or → key to move through all of the relay numbers.

19.2. Press 1 through 8 to add or delete a zone that this CAUTION relay is supposed to get activated for

19.3. If a relay number is not present because its external card is not found on the network, the message RELAY NOT AVAILABLE will be displayed on line 3.

```

CAUTION RELAY ASSIGNMENT
      RELAY :    1  ( INTERNAL RELAY :    1 )
      ZONE  :    1   2
< , > : RELAY                               1 . . 8 : TOGGLE ZONE
  
```

20. Press the MENU key.

The **WARNING RELAY ASSIGNMENT** menu will appear. The second line of the display shows the current relay number (1-40) and its network location (internal or external card and relay number on that card). The third line shows the zone(s) to which this WARNING relay is assigned. A relay may be assigned to multiple zones.

20.1. Press the ← or → key to move through all of the relay numbers.

20.2. Press 1 through 8 to add or delete a zone that this WARNING relay is supposed to get activated for

20.3. If a relay number is not present because its external card is not found on the network, the message RELAY NOT AVAILABLE will be displayed on line 3.

```

WARNING RELAY ASSIGNMENT
      RELAY :    1  ( INTERNAL RELAY :    1 )
      ZONE  :    1   2
< , > : RELAY                               1 . . 8 : TOGGLE ZONE
  
```

21. Press the MENU key.

The **ALARM RELAY ASSIGNMENT** menu will appear. The second line of the display shows the current relay number (1-40) and its network location (internal or external card and relay number on that card). The third line shows the zone(s) to which this ALARM relay is assigned. A relay may be assigned to multiple zones.

21.1. Press the ← or → key to move through all of the relay numbers.

21.2. Press 1 through 8 to add or delete a zone that this ALARM relay is supposed to get activated for

21.3. If a relay number is not present because its external card is not found on the network, the message RELAY NOT AVAILABLE will be displayed on line 3.

```

ALARM RELAY ASSIGNMENT
      RELAY :    1  ( INTERNAL RELAY :    1 )
      ZONE  :    1   2
< , > : RELAY                               1 . . 8 : TOGGLE ZONE
  
```

ZGARD CX II Controller Operation & Configuration Set Up Menu

22. Press the MENU key.

The **RELAY LATCHING** menu will appear. The second line of the display shows the current relay number (1-40) and its network location (internal or external card and relay number on that card).

22.1. **Change Relay Latch Mode:** Press ENTER to cycle through the available modes (YES or NO) until the desired mode appears.

22.2. **Next relay number:** Press the ← or → key to move through all of the relay number assignments.

```

RELAY LATCHING
  RELAY :    1  ( INTERNAL RELAY :    1 )
  LATCHING : NO
< , > : RELAY                ENTER : CHANGE

```

23. Press the MENU key.

The **RELAY OPERATION** menu will appear. The second line of the display shows the current relay number (1-40) and its network location (internal or external card and relay number on that card).

23.1. **Change Relay Mode:** Press ENTER to cycle through the available modes (DE-ENERGIZED or ENERGIZED) until the desired mode appears.

23.2. **Next relay number:** Press the ← or → key to move through all of the relay assignments.

```

RELAY OPERATION
  RELAY :    1  ( INTERNAL RELAY :    1 )
  MODE :  NORMALLY DE-ENERGIZED
< , > : RELAY                ENTER : CHANGE

```

24. Press the MENU key.

25. The **CAUTION OFF DELAY** menu will appear. The second line of the display shows the current OFF delay in seconds. The delay may be set to any value from 0 to 600 seconds. The OFF delay is common to all points. The following choice is available:

25.1. **Change delay period:** Type the new delay period and press ENTER.

```

CAUTION OFF DELAY
                                DELAY :    10 SECONDS
                                0 . . 9 : VALUE                ENTER : ACCEPT

```

26. Press the MENU key.

27. The **WARNING OFF DELAY** menu will appear. The second line of the display shows the current OFF delay in seconds. The delay may be set to any value from 0 to 600 seconds. The OFF delay is common to all points. The following choice is available:

27.1. **Change delay period:** Type the new delay period and press ENTER.

```

WARNING OFF DELAY
                                DELAY :    10 SECONDS
                                0 . . 9 : VALUE                ENTER : ACCEPT

```

Section 9
ZGARD CX II Controller
Operation & Configuration Set Up Menu

28. Press the MENU key.

29. The **ALARM OFF DELAY** menu will appear. The second line of the display shows the current OFF delay in seconds. The delay may be set to any value from 0 to 600 seconds. The OFF delay is common to all points. The following choice is available:

29.1. **Change delay period:** Type the new delay period and press ENTER.

```

A L A R M   O F F   D E L A Y           D E L A Y :   1 0   S E C O N D S
                                           0 . . 9 : V A L U E           E N T E R : A C C E P T
  
```

30. Press the MENU key.

31. The **SENSOR CALIBRATION DISPLAY** menu will appear. The second line of the display shows the sensor number, the RS-485 port that it is located on (1-4) and the operating range value. The third line of the display shows of the currently selected sensor's gas concentration level and gas type. While the menu is in calibration menu there is no alarm function or relay action, this screen mode is for indication only.

A. **Go to other point:** Press the ← or → key to move through all of the desired sensor numbers.

```

S E N S O R   D I S P L A Y   ( F O R   C A L I B R A T I O N )
S E N S O R :      1   P O R T :      1           R A N G E :      1 0 0 P P M
  G A S   L E V E L :      0 P P M           G A S :   C O
< , > : S E N S O R           R E F R E S H @ 3 S E C
  
```

32. Press the MENU key.

33. The **TIME SET** menu will appear. The second line of the display shows the current time in a 24hr hh:mm:ss format. The '^' pointer indicates which time component may be adjusted. The following choices are available:

33.1. **move pointer:** Press ENTER to cycle through Hour, Minute, Second position

33.2. **adjust time:** Press the ← or → key to decrease or increase the value above the pointer (← decreases the value; → increases the value)

```

S Y S T E M   C L O C K
  1 2 : 0 0 : 0 0   J A N   0 1 ,   2 0 0 8
  ^ ^
< , > : F I E L D           0 . . 9 : V A L U E           E N T E R : A C C E P T
  
```

34. Press the MENU key.

35. The **SERIAL I/O** menu will appear. The type of Serial I/O currently selected is indicated by TYPE. Choices are: OFF, BACNET, MODBUS ASCII or MODBUS RTU. Configuration of baud rate and address for BACNET are done on the BACNET plug-in module. MODBUS framing is not selectable and is fixed for ASCII as 7 data, 1 stop, even parity and for RTU as 8 data, 1 stop, no parity. For MODBUS the configuration is done on the CX-II as follows:

35.1. **BAUD Rate:** Press the ← or → key to change the BAUD rate. Available choices are: 9600, 19200 and 38400

35.2. **Address:** Press any number key to select the MODBUS address (DO NOT press ENTER)

35.3. **Type:** Press the ENTER button to change the type of SERIAL I/O. Available choices are: OFF, BACNET, MODBUS ASCII and MODBUS RTU

ZGARD CX II Controller Operation & Configuration Set Up Menu

```

S E R I A L   I / O           T Y P E : B A C N E T
                                     E N T E R : T Y P E
  
```

```

S E R I A L   I / O           T Y P E : A S C I I
                               B A U D :   9 6 0 0   ( 7 , E , 1 )
                               A D D R E S S :           1
< , > : B A U D           1 . . 9 : A D D R E S S           E N T E R : T Y P E
  
```

```

S E R I A L   I / O           T Y P E : R T U
                               B A U D :   9 6 0 0   ( 8 , N , 1 )
                               A D D R E S S :           1
< , > : B A U D           1 . . 9 : A D D R E S S           E N T E R : T Y P E
  
```

36. Press the MENU key

37. The **ACCESS CODE** menu will appear. To change the Set-up Menu access code, type in a new code and press ENTER. The access code can be up to 4 digits in length and consist of any combination of numbers from 0 to 9.

```

A C C E S S   C O D E
                               N E W   C O D E :   1 2 3 4
                               0 . . 9 : V A L U E           E N T E R : A C C E P T
  
```

38. Press the MENU key.

39. The menu system now repeats from the first menu (Auto-Config).

40. To exit the configuration menu system at any time, press the RUN key.

Section 10

ZGARD CX II Controller

Start-Up Procedure

When wiring, checking or working within a ZGARD CX II Controller, always disconnect the main power to prevent bodily harm.

1. Loosen the locking screws on front of the controller and open the door.
2. Locate the power switch on main circuit board inside controller enclosure.
3. Check all wiring connections are correct and secure.
4. Confirm the RS485 digital remote sensors associated with the controller are appropriately assigned a unique binary address code. **Refer to the appropriate gas sensor manual for further details.**
5. Power up the controller and observe the behavior of the following indicators;
Green LED (SYSTEM OK) Indicator on front panel should be ON.
Red LED (SYSTEM FAULT) Indicator on front panel should be OFF.
Amber LED (CAUTION) Indicator should be OFF
Amber LED (WARNING) Indicator on front panel should be OFF.
Red LED (ALARM) Indicator on front panel should be OFF.

During initial power up of the controller, the local audible alarm may be activated, press RESET button to silence.

6. Allow the associated remote gas sensors to stabilize. **Refer to the ZGARD S or GS sensor manual for further details.**

Depending on the controller's warning, alarm and delay settings, the display status and the relay action of the controller may vary. Refer to the installation sections of the associated ZGARD CX II Controller.

7. Confirm the functionality of the controller and that is operating according to the designed or pre-set configuration settings.
8. Apply a representative sample (at least 60% of the operating range) of the target gas to each of the associated remote gas sensors. This simple test should drive the gas sensors upscale and simulate a warning and or an alarm condition on the controller. **Refer to the ZGARD S or GS sensor manual for further details.**

During this procedure, the audible device may be activated, press RESET button to silence.
The warning and alarm indicators and the corresponding relays may be activated.

Depending on the controller's warning and alarm set-points and delay feature settings, the Warning and Alarm relays may be activated.

Any remote equipment, which may be connected to the controller relay contacts, should now be activated.

9. Remove any test equipment from the sensor and controller.
10. Secure the locking screws on the front door of the ZGARD CX II Controller.
11. Secure the locking screws on cover or front door of the associated remote gas sensors.
 - ✓ The initial function test of the ZGARD CX II Controller is now completed.

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⚠ CAUTION: BONDING BETWEEN CONDUIT CONNECTIONS NOT AUTOMATIC AND MUST BE PROVIDED AS A PART OF THE INSTALLATION.


⚠ CAUTION
 This Equipment Could Have Voltages Up To 250VAC, From Other Devices, In Other Locations.

REPLACEMENT BATTERY		
Manufacture	Model	UL File#
Panasonic	CR2032	MH12210
Energizer	CR2032	MH29980
Sony Corp	CR2032	MH12566

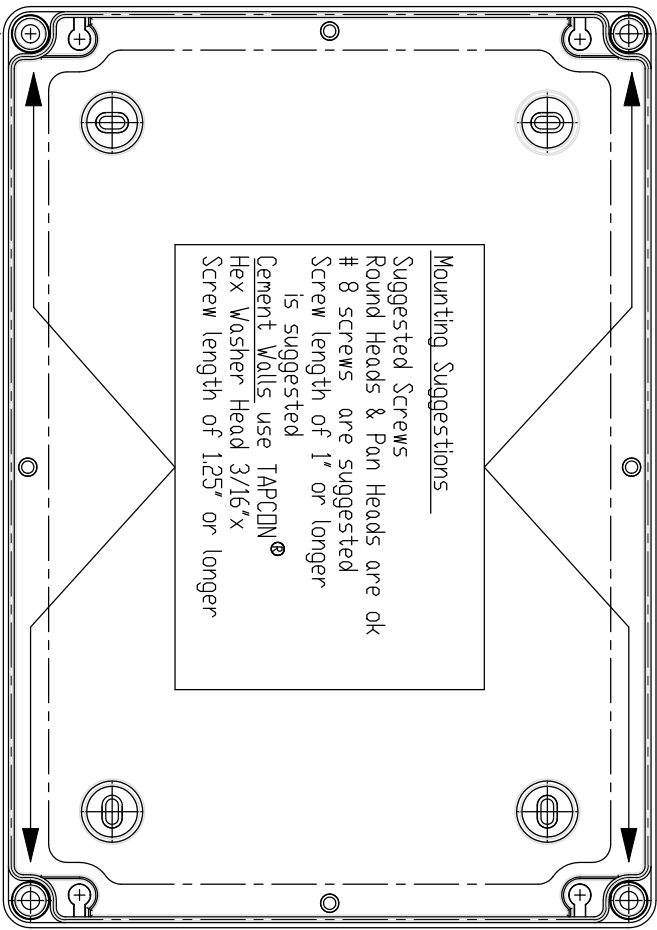
 MSA <i>The Safety Company</i>	ZGARD CX-II-xx-xx Gas Monitoring Station
	Power: 17-27VAC, 50/60Hz or 24-38VDC 0.3Amp (0.7Amp with strobe, AC only) Input: RS-485, 99 ZGARD Sensors max. Output: 4 Relays with 2 'C' Contacts each 5A max. @ 250VAC or 30VDC Serial No.: 000000-0 www.msasafety.com

 MSA <i>The Safety Company</i>	ZGARD RRM-xx-xx Remote Relay Module
	Power: 17-27VAC, 50/60Hz or 24-38VDC 0.3Amp (0.7Amp with strobe, AC only) Input: RS-485, 99 ZGARD Sensors max. Output: 4 Relays with 2 'C' Contacts each 5A max. @ 250VAC or 30VDC Serial No.: 000000-0 www.msasafety.com

LABEL INFORMATION
 Material 3M 7840TL
 UL reconized (File MH16411)
 Printer HP Lazer Jet 4200
 Ink Cartridge Q1338A

 MSA		
CHKD: V.B	DATE: Feb 19/13	DRN: D.P
ZGARD CX II & ZGard RRM Rating Labels		
DWG. NO.: 108710		REV. A

To screw ,screw – close door--remove plug
Screw down enclosure--replace plug



Mounting Suggestions

Suggested Screws
Round Heads & Pan Heads are ok
8 screws are suggested
Screw length of 1" or longer
is suggested
Cement Walls use TAPCON®
Hex Washer Head 3/16"x
Screw length of 1.25" or longer

To screw ,screw – close door--remove plug
Screw down enclosure--replace plug

MOUNTING THE UNIT

1. Do not mount the unit to structures subject to vibration and shock.
2. Do not locate the unit near an excessive heat source.
3. Allow at least 3" of clearance around the unit,for proper cooling.
4. Do not mount the unit where it will be exposed to direct solar heat, rain & splashing water.
5. Mount the unit where it is accessible for maintnance.

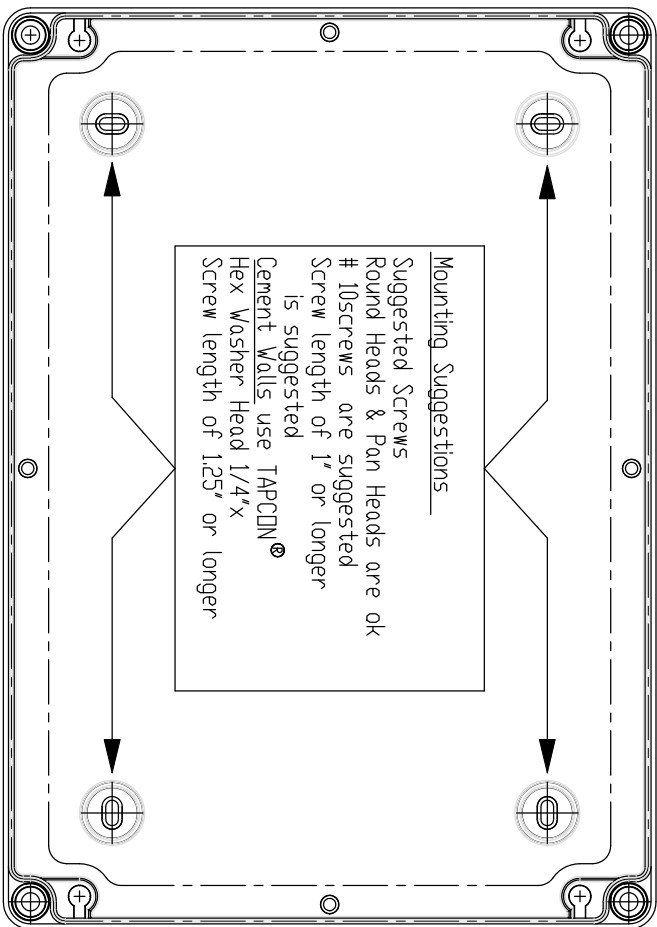
CAUTION: BONDING BETWEEN CONDUIT CONNECTIONS NOT AUTOMATIC AND MUST BE PROVIDED AS A PART OF THE INSTALLATION.

MSA

CHKD.V:B | DATE:FEB 12/13 | DRN: D.P
Zgard CXII Mounting Instructions &
Zgard RRM Mounting Instructions

DWG. NO.: 108680-1 | REV. A

To screw ,screw – close door--remove plug
Screw down enclosure--replace plug



Mounting Suggestions

Suggested Screws
Round Heads & Pan Heads are ok
10screws are suggested
Screw length of 1" or longer
is suggested
Cement Walls use TAPCON®
Hex Washer Head 1/4"x
Screw length of 1.25" or longer

To screw ,screw – close door--remove plug
Screw down enclosure--replace plug

MOUNTING THE UNIT

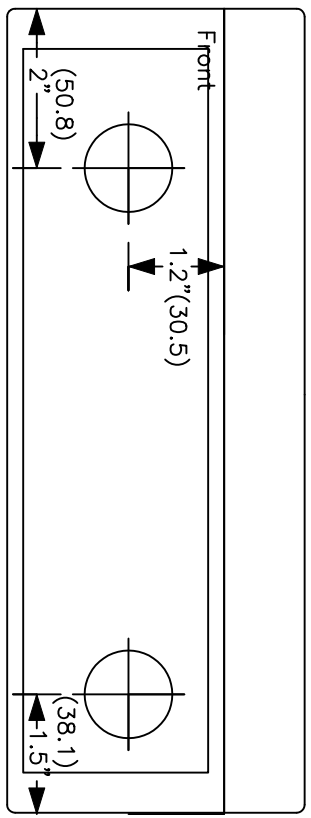
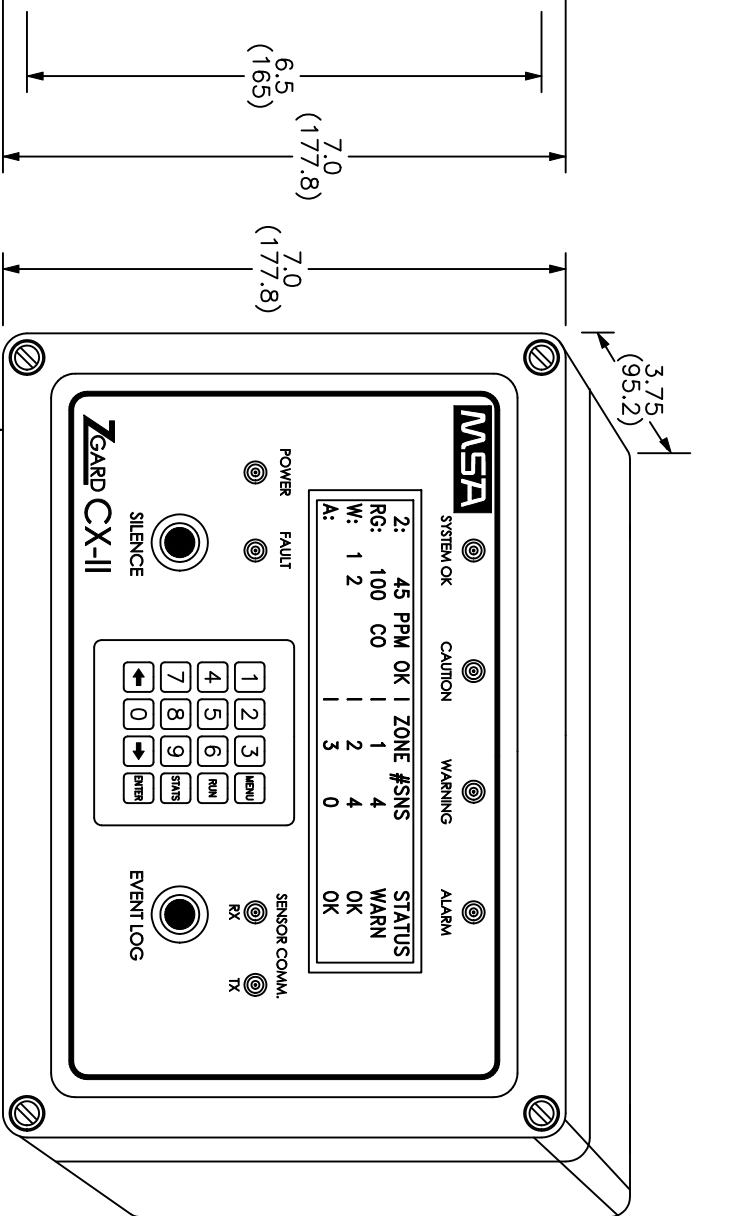
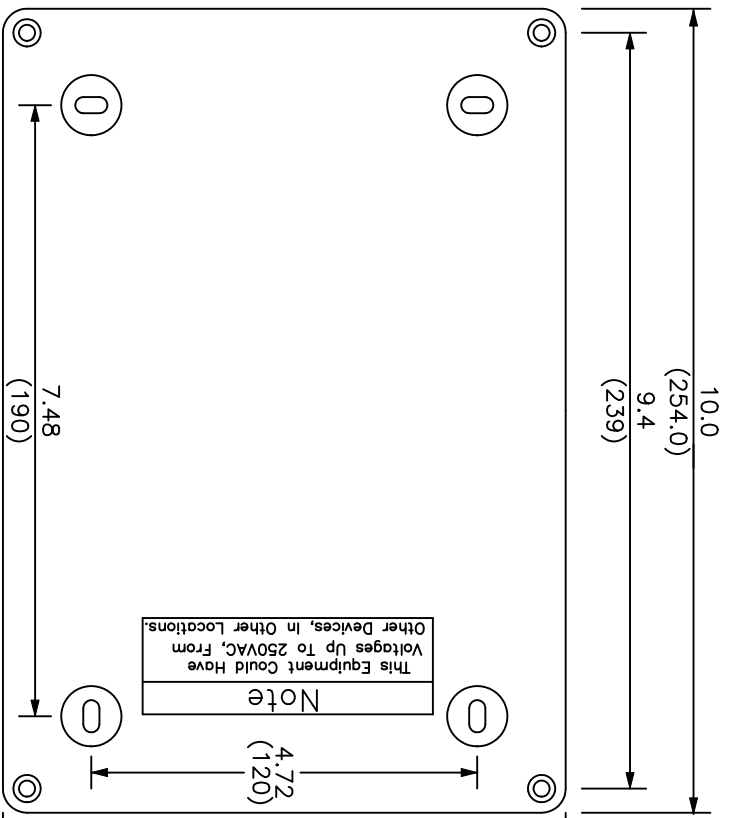
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5. Mount the unit where it is accessible for maintnance.

CAUTION: BONDING BETWEEN CONDUIT CONNECTIONS NOT AUTOMATIC AND MUST BE PROVIDED AS A PART OF THE INSTALLATION.

MSA

CHKD.V:B | DATE:FEB 12/13 | DRN: D.P
Zgard CXII Mounting Instructions &
Zgard RRM Mounting Instructions

DWG. NO.: 108680-2 | REV. A



ENCLOSURE HOLES NOT SUPPLIED

SUGGESTIONS FOR HOLES
The Holes are 1.1" (27.95) holes for the use of 3/4 conduit terminal adaptors. The conduit can be Non-Metallic or Metallic. The conduit can also be Rigid or Flexible type. Check with the local governing agency.

POLYCARBONATE ENCLOSURE WITH SCREW COVER

NOTE 1: BONDING BETWEEN CONDUIT CONNECTIONS NOT AUTOMATIC AND MUST BE PROVIDED AS A PART OF THE INSTALLATION.

Rev.D Encl. Hole Info.

Rev.C Bonding Label

Rev.B Conduit holes added



CHKD: DATE: Jun. 26/08 DRN: MG

ZGARD CX II
Programmable Controller
Enclosure & Dimensions

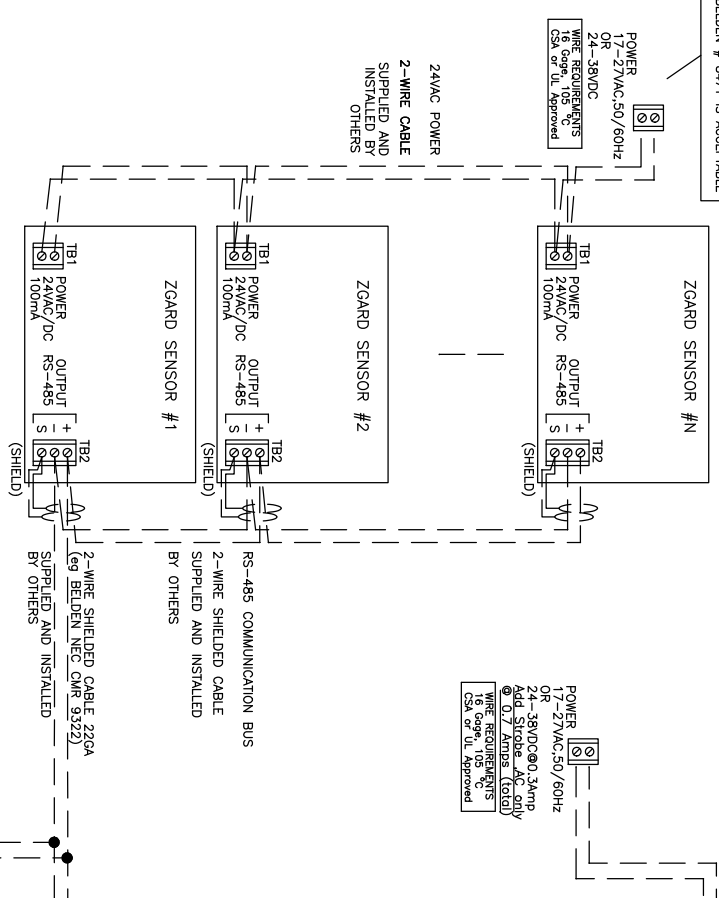
DWG. NO.: 107390-1 REV. D

- NOTES:
1. DIMENSIONS SHOWN IN INCHES (MILLIMETERS).
 2. SYSTEM MAY CHANGE TO IMPROVE PERFORMANCE.

NOTE: MULTIPLE 24VAC TRANSFORMERS SHOULD BE USED SO POWER WIRE CAN BE 16 GAUGE (9 AMPS MAX) BELDEN # 8471 IS ACCEPTABLE

FOR DAISS-CHAIN (SERIES) WIRING OF ZGARD S SENSORS TO THE ZGARD CX II AS SHOWN HERE, EACH SENSOR MUST BE UNIQUELY ADDRESSED VIA SWITCHES ON SENSOR CIRCUIT BOARD.

ZGard CXII CONTROLLER



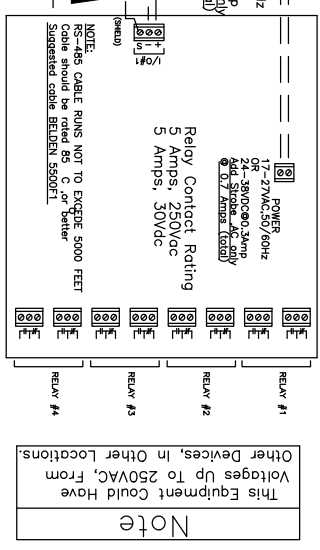
POWER
17-27VAC/50/60Hz
OR
24-38VDC
WIRE REQUIREMENTS
16 Gauge, 105 °C
CSA or UL Approved

24VAC POWER
2-WIRE CABLE
SUPPLIED AND
INSTALLED BY
OTHERS

RS-485 COMMUNICATION BUS
2-WIRE SHIELDED CABLE
SUPPLIED AND INSTALLED
BY OTHERS

2-WIRE SHIELDED CABLE 292A
(9) BELDEN NEC OMV 93272
SUPPLIED AND INSTALLED
BY OTHERS

REMOTE RELAY MODULE (ZGard RRM)



WIRE REQUIREMENTS
17-27VAC/50/60Hz
OR
24-38VDC
WIRE REQUIREMENTS
16 Gauge, 105 °C
CSA or UL Approved

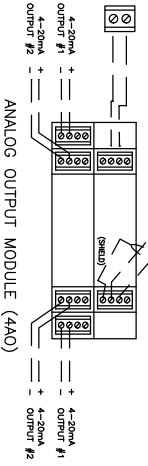
POWER
17-27VAC/50/60Hz
OR
24-38VDC
WIRE REQUIREMENTS
16 Gauge, 105 °C
CSA or UL Approved

NOTE:
RS-485 CABLE RUNS NOT TO EXCEED 5000 FEET
Cable should be rated 85 °C, or better
Suggested cable BELDEN 5500F1

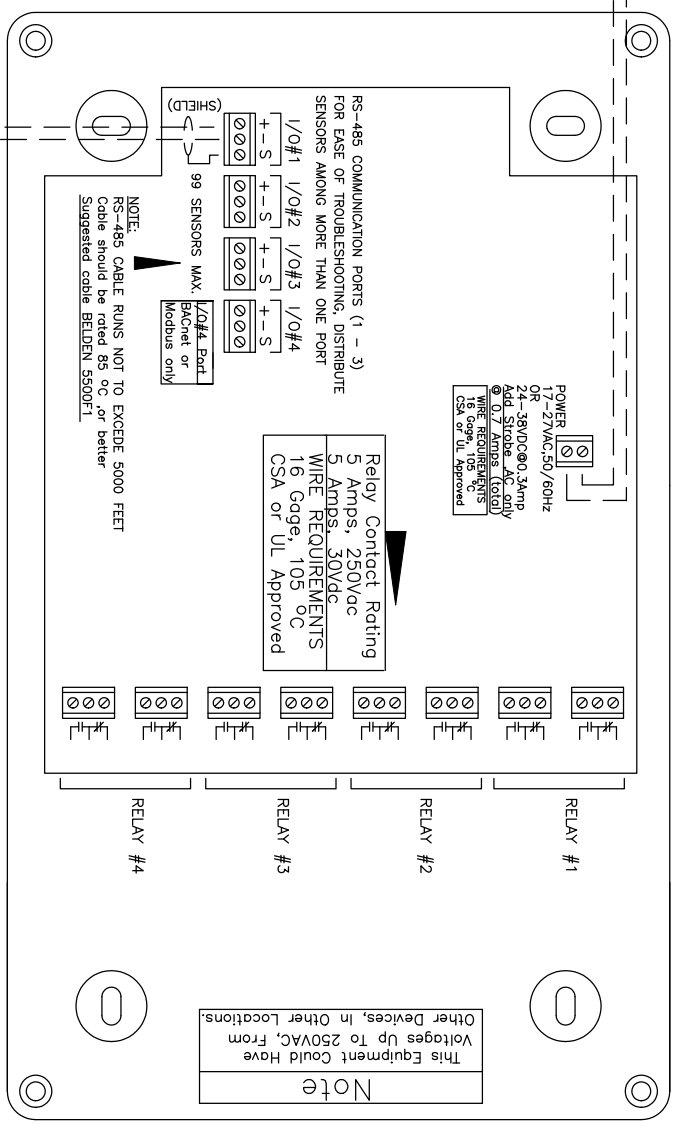
RELAY #1
RELAY #2
RELAY #3
RELAY #4

Note
This Equipment Could Have
Voltages Up To 250VAC, From
Other Devices, In Other Locations.

POWER
17-27VAC/50/60Hz
OR
24-38VDC
WIRE REQUIREMENTS
16 Gauge, 105 °C
CSA or UL Approved



ANALOG OUTPUT MODULE (4AO)



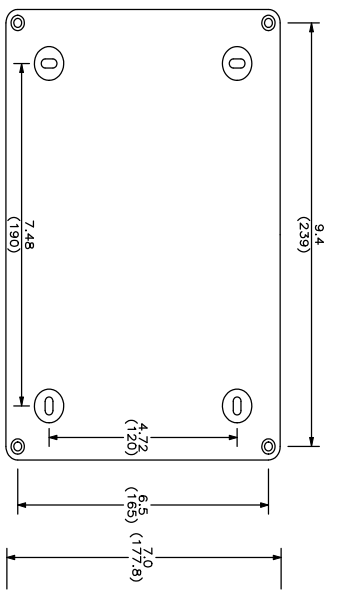
POWER
17-27VAC/50/60Hz
OR
24-38VDC
WIRE REQUIREMENTS
16 Gauge, 105 °C
CSA or UL Approved

Relay Contact Rating
5 Amps, 250Vdc
WIRE REQUIREMENTS
16 Gauge, 105 °C
CSA or UL Approved

RS-485 COMMUNICATION PORTS (1 - 3)
FOR EASE OF TROUBLESHOOTING, DISTRIBUTE
SENSORS AMONG MORE THAN ONE PORT
I/O#1 I/O#2 I/O#3 I/O#4
I/O#4 Port
BACnet or
Modbus only

NOTE:
RS-485 CABLE RUNS NOT TO EXCEED 5000 FEET
Cable should be rated 85 °C, or better
Suggested cable BELDEN 5500F1

Note
This Equipment Could Have
Voltages Up To 250VAC, From
Other Devices, In Other Locations.



Note: BONDING BETWEEN
CONDUCTIVE CONNECTIONS NOT AUTO-
MATIC AND MUST BE PROVIDED AS
A PART OF THE INSTALLATION.

REV.E I/O#4 BACnet Label
REV.D Cautions Removed
REV.C Powerlabels/Relay Rating
REV.B Sensor Wiring Changed + ZRM



CHKD: V.B	DATE: Jun. 26/08	DRN: D.P
ZGARD CX II Programmable Controller Installation Outline		
DWG. NO.:	107389-1	REV. E

NOTES:
1. DIMENSIONS SHOWN IN INCHES (MILLIMETERS).
2. SYSTEM MAY CHANGE TO IMPROVE PERFORMANCE.