



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.

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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

WARNING

1. The ZGARD C8P 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 C8P 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 monitor is not explosion-proof, it must be located in non-hazardous areas.
3. Do not paint the ZGARD C8P Programmable Controller.
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 C8P 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 C8P 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.

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

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Section 1

ZGARD C8P Controller

General Information and Specifications

The ZGARD C8P Controller provides programmable operating parameters, which are organized by a menu interface keypad. The monitor accepts up to 8, 4-20mA analog or RS485 digital network sensors. The MSA ZGARD S or GS sensor-transmitters are available to detect a wide variety of gases including Carbon Monoxide, Carbon Dioxide, Nitrogen Dioxide and Refrigerants. Standard features include a large LED Display, audible and visual status indicators with relay outputs, creating a control and surveillance gas alarm monitoring system.

OPERATING SPECIFICATIONS

Remote Sensor Input	RS485 digital data bus, 4-wire connection
Remote Sensor Power	24Vdc at 100mA / Input
Network Capacity	8 Remote Gas Sensors
Power Requirements	STANDARD, 120Vac, 50/60 Hz $\pm$ 10% at 2.5 Amps OPTIONAL, 220Vac, 50/60 Hz $\pm$ 10% at 1.25 Amps
Remote Sensor Power	RS485, 4-wire serial bus connection for up to 8 remote sensors. (Maximum sensor power, 24Vdc @ 3.0 Amps. (5.0 Amps Peak) OR 4-20mA, 3-wire connections for up to 8 remote sensors. (Maximum sensor power, 24Vdc @ 3.0 Amps. (5.0 Amps Peak)
Operating Temperature	-10° to 40°C (14° to 104°F)
Storage Temperature	-20° to 50°C (-4° to 122°F)
User Interface	Keypad on the front panel of the monitor with menu driven operating parameters
Digital Display Screen	5 Digit LED Display with 2 second scanning interval.
Operating Range	1.0 to 9999, Full Scale
Status Display	Discrete LED's for Sensor OK-Green, Warning- Amber and Alarm-Red
Network Communication	RS485, 4-wire serial communication for remote gas sensors and auxiliary modules
Alarm & Warning Set-points	Adjustable from 1 to 99% of operating range for each system sensor type
Number of Relays	8 standard programmable Warning and Alarm Relays, SPDT
Auxiliary Relays	1 common Fault Relay, SPDT, Normally Energized (Sensor Fail) 1 common Auxiliary Relay, SPDT. (KHA) Selected as Common Alarm or Horn Relay
Relay Contacts Rating	10 Amps 1/8 H.P., 125Vac. 6 Amps 1/8 H.P., 277Vac. 5 Amps, 30Vdc.
Relay Action	All programmable relays can be defined as Normally Energized or De-Energized and Latching or Non-Latching
Relay Time Delays	Menu selected OFF delays, adjustable from 0 to 60 minutes seconds for Warning and Alarm, effectively common to all active channels
Set-up and Calibration	Pre-configured at factory or configurable by user
Audible Alarm	Audible Alarm Device, 93 dB @ 0.3 meters
Pushbutton	Alarm Reset and Silence feature
Remote Relay Modules (RRM)	Up to 7 OPTIONAL RRM'S can be coupled with the controller. Each relay module provides a complement of 16 relays that can be assigned with a function or mimic the operating parameters, directed by the host ZGARD C8P Controller
Remote Analogue Output Module (RAM)	The RAM can be coupled with the controller, providing 8, 4-2mA Output Signals
Strobes Options	OPTIONAL flashing Strobes factory mounted on the top of the enclosure
Enclosure	Metal, NEMA 12
Dimensions	15" (381 mm) H x 12" (305 mm) W x 3.75" (95 mm) D
Weight	4.5kg (10 lbs.)
Certification	ENTELA (to CSA Standards)

Section 2

ZGARD C8P Controller

Installation Guidelines

The performance of ZGARD C8P 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 C8P 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 C8P controllers Installation Outline drawings 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.
- 4-20mA Output wiring connection.

CAUTION

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 controllers 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 C8P Controller may not be able to communicate appropriately.
6. When connecting the remote sensors, make sure that all wiring is correct and the four 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.
8. The fuse at the input is a SloBlo type fuse and REPLACE FUSE ONLY WITH A FUSE WITH THE SAME RATING.

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

ZGARD C8P Controller Features

Readout: LED display exhibits the active channel number and the corresponding sensor gas concentration level. The display scans through all of the active channels at 2-second intervals.

Sensor Inputs: The ZGARD C8P controller accepts up to 8 remote gas sensors. The MSA ZGARD S or GS, 4-20mA 2 or 3-wire analogue or RS485 type sensors. The input threshold for analog inputs is 3.5mA, if an input signal drops below 3.5mA it is regarded as a failed analog input. The RS485 serial communication sensors are automatically recognized by the controller and establish the sensor range and gas code type.

Warning and Alarm Scheme: During a Warning event, the associated Warning (Amber) LED will turn on and the warning relay will be activated. No audible alarm is set off at this time. Once a warning occurrence has been abated, the associated warning LED will turn off and the warning relay will be deactivated. If the 5 minute delay feature is selected, then this action takes place after a 5 minute delay period.

During an Alarm event, the associated Alarm (Red) LED will turn on and the alarm relay will be activated. If the 5 minute delay feature is selected and the alarm event has prolonged for a period of 5 minutes, then the alarm relay will be activated and the audible device will sound. Pressing the reset button on the front panel will silence the audible device. Once the alarm occurrence has been

abated, the audible device will silence (if not silenced already by reset button) and the alarm relay will be deactivated. If any other active channels reach the alarm state, the audible device will sound with every new alarm event. Once all of the active channels have been cleared of alarm events, the audible device will silence (if not silenced already by reset button) and the alarm relay will be deactivated.

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

Optional Remote Relay Module (RRM): 16 extra relays can be added by linking the monitor to a Remote Relay Module. The module is coupled to the monitor by employing the RS485 data communication bus port facility. The Remote Relay Module may be installed up to 1000 feet away from the ZGARD C8P controller, anywhere on the data bus.

Optional Remote Analogue Output Module (RAM): 8, 4-20mA signal outputs are also available by adding a Remote Analogue Output Module. The module is coupled to the monitor by employing the RS485 data communication bus port facility. The Remote Analogue Output Module may be installed up to 1000 feet away from the ZGARD C8P controller, anywhere on the data bus.

Section 4

ZGARD C8P Controller

Operating Description

Status Operation: During normal operation the monitor Sensor OK LED's (Green) indicate that the sensors connected to the monitor are present and that the signals are valid. In the case of a 4-20mA-type connection, a lit Sensor OK LED indicates that the input signal is above 3.5mA.

Sensor Failure: If the signal from a remote sensor fails, the Sensor OK LED (Green) for that channel will turn off. If a sensor has failed to provide a valid signal the display shows - - - - in place of the gas level.

Relay Operation: The monitor provides 8 relays that can be assigned as a Warning or Alarm operation. Care must be taken when assigning the relays as the warning status and alarm status of one or more points may be assigned to the same relay. There is a delay involved in the relay dropout based on OFF Delay setting. The minimum OFF delay is 10 seconds.

Warning Condition: When the gas level of a channel exceeds the Warning set point, the Warning LED (AMBER) for that channel will flash slowly to indicate a new alarm. The Warning LED will turn on solid once the Alarm Reset button is pressed. When the condition has been cleared the Warning LED will go out again, if the non-latching mode is selected for that channel. If the latching mode is selected, the Warning LED will flash very slowly once the alarm condition has been cleared for that channel. This is to indicate that an alarm was present but has gone away. Pressing the Alarm Reset button turns the slow flashing Warning LED off completely.

Alarm Condition: When the gas level of a channel exceeds the Alarm set point, the Alarm LED (RED) for that channel will flash slowly to indicate a new alarm. The Alarm LED will turn on solid once the Alarm Reset button is pressed. When the condition has been cleared the Alarm LED will go out again, if the non-latching mode is selected for that channel. If the latching mode is selected, the Alarm LED will flash very slowly once the alarm condition has been cleared for that channel. This is to indicate that an alarm was present but has gone away. Pressing the Alarm Reset button turns the slow flashing Alarm LED off completely.

Warning Status Relays: When the gas level of a channel exceeds the Warning set point, the relay assigned to that channel will activate. When the condition has been cleared the relay will deactivate, if the non-latching mode is selected for that channel. If the latching mode is selected for a Warning relay, the relay remains activated even after the condition has been cleared for that channel. Pressing the Alarm Reset de-activates the Warning relay.

Alarm Status Relays: When the gas level of a channel exceeds the Alarm set point, the relay assigned to that channel will activate. When the condition has been cleared the relay will deactivate, if the non-latching mode is selected for that channel. If the latching mode is selected for an Alarm relay, the relay remains activated even after the condition has been cleared for that channel. Pressing the Alarm Reset de-activates the Alarm relay.

Sensor Fail Relay: The Sensor Fail Relay always operates in a normally energized mode. If all active sensors provide a valid input signal, the Sensor Fail Relay will be ON! If one or more signals from any of the remote sensors fail, the Sensor Fail Relay will turn OFF. The Sensor Fail Relay is always non-latching and will return to a de-activated state (normally energized) as soon as all of the active sensors provide valid input signal.

Audible Alarm: The local audible device will sound every time a new alarm occurs. Pressing the Alarm Reset button will silence it. There are two basic modes of operation for the audible alarm. A different mode can be assigned for to each channel. The two modes are Solid On or Variable On. In the Solid On mode, the audible alarm will sound continuously when a channel has exceeded the set point. In the Variable On mode, the audible alarm will sound in cycles whose ON-time is directly related to the amount that the alarm set point is exceeded. The maximum cycle time is 8 seconds. This scheme provides an audible indication depending on how serious the alarm condition is and may not require immediate attention if the alarm level is low (i.e. Short beeps). If some channels on the ZGARDS C8P controller are set to Solid On and other to Variable On, the Solid On mode will take precedence over the Variable On, should both become activated.

**ZGARD C8P Controller
Operating Parameters**

Sensor Range: The monitor has individually adjustable sensor ranges for each channel. Full Scale ranges can be set from 1.000 to 9999. This makes it extremely flexible by allowing up to eight different gases to be monitored with one unit. If RS485-type sensors are used with the controller, then the sensor range is automatically recognized. Each sensor will send its range code to the controller, which will then adjust the sensor range and all related values accordingly.

Warning & Alarm Set points: The monitor has individual set points for warning and alarm for each channel. Set points may be set to any level between 0 and the sensor full operating range assigned to that point. If an attempt is made to enter a set point higher than the sensor range, the set point will be reduced to the maximum sensor range value. Depending on the Increasing/Decreasing set point setting, the set points for a channel can act on either a rising or falling gas level, respectively. Special care must be taken when adjusting Decreasing Set points. In this mode the Warning set point must be higher than the alarm set point.

Increasing Set points: In this mode a channel will detect a rising level of gas. The alarm set point must be higher than the warning set point in order for this mode to operate properly. A warning or alarm condition will be executed if the gas level rises above the appropriate set point.

Decreasing Set points: In this mode a channel will detect a falling level of gas. The alarm set point must be lower than the warning set point in order

for this mode to operate properly. A warning or alarm condition will be executed if the gas level falls below the appropriate set point.

Warning & Alarm Delays: The monitor has individual delay adjustments for both warning and alarm relays. The warning delay is an OFF delay which keeps a particular relay activated for a length of time after the warning condition has diminished.

The alarm delay is an OFF delay which keeps a particular relay activated for a length of time after the alarm condition has diminished. Both alarm delays are adjustable in 1-minute increments from 0-60 minutes. A minimum delay of 10 seconds is imposed even if a delay is set to 0. This will keep the relays from chattering on and off if a gas level is right at the set point threshold.

Warning & Alarm Latching: The warning and alarm function of each channel may individually be set to latch. If a channel is operating in a latched mode the associated warning/alarm relay(s) and LED's will remain activated even after the warning and alarm condition has been cleared. To return the warning/alarm relay(s) and LED's to their inactive state the Alarm Reset button must be pressed.

Relay Operation: Each relay, with the exception of the Sensor Fail relay, can be individually set to be normally energized or de-energized condition.

Channel Activation: Each channel may individually be enabled or disabled. If a sensor is disabled, then the display will skip that channel during the scanning cycle.

Section 6

ZGARD C8P Controller Introduction to Configuration

The ZGADS C8P controller is configured via the keypad on the front panel. To prevent unauthorized access, an entry code must be entered before the configuration mode becomes active. Keep this code out of reach of unauthorized personnel to prevent tampering of the settings. The code is on a separate page at the end of this user guide. Remove the page and keep it in a safe place if necessary. **WARNING!** During configuration, the monitor will NOT monitor any sensor inputs. All relays are frozen and will NOT activate or de-activate if the gas level at the sensors should change.

Entry Code: In order to gain access to the 16 configuration menus, first press the MENU button and then type in the 4-digit entry code. If you don't get it right, simply press the MENU button again and re-enter the code. The entry code can be modified for security.

MENU Selection: Once you have entered the correct code, the monitor will enter its configuration mode. The first menu LED will light up. Pressing the MENU key repeatedly will cycle through all of the configuration menus.

Point Selection: Once you have selected the function you want to change, enter the channel number you wish to change. Channel selection is different for some menus.

Entering a Numeric Value: To enter a number as the value of the function and channel you have selected, simply type it using the number keys on the keypad followed by the ENTER key. Entering numbers may take a little practice since the first number entered will appear at the leftmost position of the available display area. If you are trying to enter a value of 35 into a 3-digit value you must first type '0' followed by 35 and ENTER.

Completing the Task: When all of the parameters have been completed, simply press the RUN key to return the normal operating mode.

Automatic Time Out: There is a 1-minute time-out that returns the monitor to the RUN mode automatically if no keys are pressed for 1 minute. This time-out is extended to 60 minutes during the Calibration Mode.

Section 7

ZGARD C8P Controller Configuration Procedure

Full Scale Value: This menu allows each channel to be set to a different full-scale gas value between 1.0 and 9999. Select the channel using the ← and → keys. The full scale only applies to 4-20mA sensor inputs. RS485-type sensors are automatically recognized to match their respective full scale operating range. This menu is the only menu that allows a decimal point to be set. All other menus using decimal points will default to the decimal point position set for each channel by this menu.

Warning Set point: This menu sets the warning set point for each channel. Select the channel using the ← and → keys. The warning set point may not exceed the full-scale range set in the full-scale value menu. If this should happen, the set point is reduced to the full-scale value for that channel.

Alarm Set point: This menu sets the alarm set point for each channel. Select the channel using the ← and → keys. The alarm set point may not exceed the full-scale range set in the full-scale value menu. If this should happen, the set point is reduced to the full-scale value for that channel.

If a channel is enabled as a Combustible Gas type, the set points may only be adjusted as high as 60% of the sensor's full scale operating range. The ZGARD C8P controller will automatically provide these upper limits. This automatic set point adjustment will also occur if a RS485 sensor is connected with a range that is lower than the current setting of the set point. The controller does not need to be in the configuration mode for this to occur. As soon as a sensor is connected whose set point exceeds its range, the set point will be adjusted automatically.

Warning OFF Delay: This menu sets the warning OFF delay for each channel. The delays are adjustable from 0-60 minutes in 1-minute increments. A delay of 0 minutes will have a minimum delay of 10 seconds preventing relay chattering.

Alarm OFF Delay: This menu sets the alarm OFF delay for each channel. The delays are adjustable from 0-60 minutes in 1-minute increments. A delay of 0 minutes will have a minimum delay of 10 seconds preventing relay chattering.

Warning Relay Assignment: This menu assigns the relays that are to activate when the defined channels show a warning status. A relay is assigned to the warning status of a channel by setting its warning activation status to **y** (for yes) for each channel.

Select the channel for which you would like to change a relay assignment by pressing that number (1 through 8) on the keypad. Use the ← and → keys to scroll through all available relay assignments. Relay assignments are displayed as the relay number (01 through 24) followed by a **y** or **n**. A **y** means that the relay will activate if the selected channel goes into warning. An **n** means that the relay will not activate for this channel. Use the ENTER key to change between **y** and **n**.

More than one relay may be assigned to the warning status of a single channel by setting all desired relays to **y**. All **y** assigned relays will then activate when that channel goes into warning.

Alarm Relay Assignment: This menu assigns the relays that are to activate when certain channel shows an alarm status. It operates exactly like the Warning Relay Assignment. See the above Warning Relay Assignment for a detailed explanation.

Relay Energize Mode: This menu assigns the relay energize mode for each relay. A relay can either be normally energized or de-energized. Assignments are made for each relay. There are no channel selections in this menu. Use the ← and → keys to scroll to the relay you wish to change. The Relay Mode is displayed as **E** for normally energized and **d** for normally de-energized. Use the ENTER key to change between **E** and **d**.

Section 7

ZGARD C8P Controller Configuration Procedure

Increasing/Decreasing Set points: This menu allows the operating mode of each channel to be set to either Increasing Set points or Decreasing Set points. Increasing and Decreasing Set points are also commonly referred to as High Trip and Low Trip, respectively. Select the channel for which you would like to change the set point mode by pressing that number (1 through 8) on the keypad. The Set Point Mode is displayed as **Incr** for increasing set points and **dEcr** for decreasing set points. Use the ENTER key to change between **Incr** and **dEcr**.

Warning Latch: This menu allows each channel to be set to latch on warning or return to the de-activated state once the warning condition has been diminished.

Alarm Latch: This menu allows each channel to be set to latch on alarm or return to the de-activated state once the alarm condition has been diminished.

Select the channel for which you would like to change the alarm latch mode by pressing that number (1 through 8) on the keypad. The Latch Mode is displayed as **LAT** for latched alarms and **nor** for non-latched alarms. Use the ENTER key to change between **LAT** and **nor**.

Calibration Mode: This menu displays the current gas level returned from the sensor selected by the ← and → keys. This menu allows for no adjustments but instead is intended to provide a feedback during sensor calibration or sensor testing without activating any relays.



CAUTION

The ZGARD C8P controller will remain in this mode for up to 60 minutes after the last keypad activity has occurred. Be sure not to leave it in the calibration mode when you have finished.

Audible Alarm: This menu allows each channel to be set to operate the audible alarm in either the Solid On or the Variable On modes. Select the channel for which you would like to change the audible mode by pressing that number (1 through 8) on the keypad. The audible Mode is displayed as **SoL** for solid audible and **vAr** for variable audible. Use the ENTER key to change between **SoL** and **vAr**.

User Code: This menu allows the user entry code to be modified to a personal security code. Enter a new 4-digit code and press ENTER to change the user access code. This code will take effect immediately after pressing the RUN button.

Channel Activation: This menu allows each channel to be activated or de-activated. If a channel is de-activated, it will not be displayed on the scanning display, and all warning and alarm functions for that channel will be disabled.

If a channel is activated as a Combustible Gas sensor input, the warning and alarm set points are automatically limited to 60% of the full-scale value of that point. If the current set points should exceed the 60% value they will automatically be reduced to the 60% level.

Select the channel for which you would like to change the active mode by pressing that number (1 through 8) on the keypad. The active mode is displayed as **On** for active points, **OFF** for inactive channels and **Comb** for combustible channels. Use the ← and → keys to change between **On**, **OFF** and **Comb**.

Press ENTER to accept your change.

ZGARD C8P Controller
Keypad Entry General Setup Procedure

Before the ZGARD C8P controller is ready to function, all of the operating parameters must be configured. There are 16 menu items, each with an LED descriptor, which illuminates when it is selected. Pressing the MENU key followed by the factory supplied default code 1111 allows access to the programming mode. After every menu item has been keyed, press ENTER key to confirm the entry. To advance to any specific menu item keep pressing the MENU key repeatedly until the desired menu appears that requires modification. **CAUTION!** During configuration, the monitor will NOT supervise any sensor inputs. All relay actions are arrested and will NOT activate or de-activate even if the gas level at any of the system sensors should change.

MENU	OPTIONS	DESCRIPTION
FUL SCALE VALUE	0001-9999	Sets the full-scale value. A different full-scale gas value can be set for each channel.
WARNING SET POINT	0001-9999	Sets the Warning set point. The Warning set point cannot exceed the full-scale value. If a channel is enabled as a combustible gas type, the set points may only be adjusted as high as 60% of the sensor's operating range. The TGM 8X-II automatically provides these upper limits.
ALARM SET POINT	0001-9999	Sets the Alarm set point. The Alarm set point cannot exceed the full-scale value. If a channel is enabled as a combustible gas type, the set points may only be adjusted as high as 60% of the sensor's operating range. The TGM 8X-II automatically provides these upper limits.
WARNING OFF DELAY	0-60	Warning OFF delay. The OFF delay for each point is adjustable from 0 to 60 minutes in 1-minute increments. A delay set at 0 will have a minimum default delay of 10 seconds to prevent relay chattering.
ALARM OFF DELAY	0-60	Alarm OFF delay. The OFF delay for each point is adjustable from 0 to 60 minutes in 1-minute increments. A delay set at 0 will have a minimum default delay of 10 seconds to prevent relay chattering.
WARNING RELAY	1 to 24 y or n	The Warning relay will activate when the selected channel reaches the warning set point. The status LED on the front panel will also be lit. More than one relay may be assigned to a channel.
ALARM RELAY	1 to 24 y or n	The Alarm relay will activate when the selected channel reaches the alarm set point. The status LED on the front panel will also be lit. More than one relay may be assigned to a channel.
RELAY MODE	1 to 24, d	Normally De-energized.
	1 to 24, E	Normally Energized.
INCREASING / DECREASING SETPOINTS	Incr	Increasing. In this mode a channel will detect a rising level of gas. The alarm set point must be higher than the warning set point in order for this mode to operate properly.
	Decr	Decreasing. In this mode a channel will detect a falling level of gas. The alarm set point must be lower than the warning set point in order for this mode to operate properly.
WARNING LATCH	LAT	Latching. (Warning relays and LED's)
	Nor	Non-Latching.
ALARM LATCH	LAT	Latching. (Alarm relays and LED's)
	Nor	Non-Latching.
CALIBRATION MODE		This menu displays the current gas level returned from the sensor selected by the ← and → keys. This menu allows for no adjustments but instead is intended to provide a feedback during sensor calibration or sensor testing without activating any relays.
AUDIBLE DEVICE	SoL	This menu allows each channel to be set to operate the audible alarm in either the Solid On or the Variable On modes.
	vAr	
USER CODE		This menu allows the user entry code to be modified to a more user acceptable code. Enter a new 4-digit code and press ENTER to change the user access code. This code will take effect immediately after pressing the RUN button.
PRESET CONFIGURATION		This menu is reserved for MSA.
POINT ACTIVATION		This menu allows each channel to be enabled or disabled. If a channel is disabled, it will not be displayed on the scanning display, and all warning and alarm functions for that channel will be de-activated. Other is used for all typical toxic gas sensors. If a channel is activated as a combustible gas sensor input, the warning and alarm set points are automatically limited to 60% of the full-scale value of that channel. If the current set points should exceed the 60% value, they will automatically be reduced to the 60% level.
	OFF	Disabled.
	On	Other.
	Comb	Combustible.

Section 9

ZGARD C8P Controller

Start-Up Procedure

When wiring, checking or working within a ZGARD C8P 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 that the selection jumpers are appropriately inserted to reflect binary code for the number of remote sensors associated with the corresponding controller.
5. Confirm that each controller's active RS485 digital remote sensor(s) are appropriately assigned a unique binary address code. **Refer to the appropriate gas sensor manual for further details.**
6. Power up the controller and observe the behavior of the following indicators;
Green LED (Sensor OK) Indicator(s) on front panel should be ON.
Amber LED (WARNING) Indicator(s) on front panel should be OFF.
Red LED (ALARM) Indicator(s) 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.

7. Allow the associated remote gas sensors to stabilize. **Refer to the appropriate gas 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 C8P Controller.

8. Confirm the functionality of the controller and that is operating according to the designed or pre-set configuration settings.
9. 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 appropriate gas 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.

10. Remove any test equipment from the sensor and controller.
11. Secure the locking screws on the front door of the ZGARD C8P Controller.
12. Secure the locking screws on cover or front door of the associated remote gas sensors.

✓ The initial function test of the ZGARD C8P Controller is now completed.

Section 10
**ZGARD C8P Controller
Parts List**

Item	Part Number
ZGARD C8P Controller Mother Board (110Vac Version)	
LED Display Board with Readout	
Keypad and Cable Assembly	
Ribbon Cable Assembly	

*** When ordering replacement parts, please state the MSA P/N and S/N of unit.**

 WARNING

Use only genuine MSA replacement parts when performing any maintenance on the ZGARD C8P Controller. Failure to do so may seriously impair instrument performance. Repair or alteration of the ZGARD C controllers, 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.

Disconnect all power source(s) to the ZGARD C8P Controller before removing or changing any components.

Section 11
ZGARD C8P Controller
Access Codes

Keep this code in a safe place so no unauthorized persons have access to it.

User Access Code: 1111

Factory Access Code: 9999