ZGARD™ CX II

Remote Relay Module (RRM)

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.

In North America., to contact your nearest stocking location, dial toll-free 1-800-MSA-INST
To contact MSA International, dial (724) 776-8626

This manual is available on the internet at www.MSAsafety.com
Manufactured by
MSA NORTH AMERICA
1000 Cranberry Woods Drive, Cranberry Township, PA 16066

REV 1.4 March 2014 p/n 10155443

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 SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.**

2. Exclusive Remedy- It is expressly agreed that Purchaser's sole and exclusive remedy for breach of the above warranty, for any tortious conduct of Seller, or for any other cause of action, shall be the repair and/or replacement at Seller's option, of any equipment or parts thereof, which after examination by Seller is proven to be defective. Replacement equipment and/or parts will be provided at no cost to Purchaser, F.O.B. Seller's Plant. Failure of Seller to successfully repair any nonconforming product shall not cause the remedy established hereby to fail of its essential purpose.

3. Exclusion of Consequential Damage- Purchaser specifically understands and agrees that under no circumstances will seller be liable to purchaser for economic, special, incidental or consequential damages or losses of any kind whatsoever, including but not limited to, loss of anticipated profits and any other loss caused by reason of non operation of the goods. This exclusion is applicable to claims for breach of warranty, tortuous conduct or any other cause of action against seller.

General Warnings

WARNING

1. The ZGARD CX II RRM Remote Relay Module 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 RRM Remote Relay Module 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.

3. Do not paint the ZGARD CX II RRM Remote Relay Module.

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 RRM Remote Relay Module, 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 RRM Remote Relay Module 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.

Table of Contents

ZGARD CX II RRM
General Information and Specifications

The ZGARD CX II RRM is an auxiliary device that works in conjunction with the ZGARD CX II Programmable Controller to provide additional relay contact outputs. The ZGARD CX II RRM can be connected onto any of the four RS485 serial communications busses of the ZGARD CX II system. Once configured via the configuration menu of the ZGARD CX II, the additional relays can be freely assigned to any function (Caution, Warning, Alarm or Fault) and to any zone or multiple zones. This allows for highly customizable system configurations.

Remote Relay Modules (RRM): Each optional Remote Relay Module (RRM) provides 4 freely assignable DPDT relays. The ZGARD CX II Controller does NOT provide the 24Vdc operating power for the ZRM's. Some applications may require the aid of a Power and Signal Booster.

REMOTE RELAY MODULE SPECIFICATIONS	
Operating Power	19-27VAC or 24-38 VDC, power provided from external source
Network Communication	RS485, 2-wire serial communication
Temperature	Operating: -10° to 50°C (14° to 122°F) Storage: -20° to 60°C (-4° to 131°F)
Relay Action	Each RRM adds 4 DPDT relays that can be assigned from within the CX II configuration menu.
Relay Contacts Rating	10 Amps 1/8 H.P., 125Vac. 6 Amps 1/8 H.P., 277Vac. 5 Amps, 30Vdc.
Enclosure	Polycarbonate NEMA 4X design
Dimensions	11.5" (292 mm) H x 9.5" (241 mm) W x 4.75" (121 mm) D
Certification	ENTELA (to CSA Standards) File No. 3118354

Section 2

ZGARD CX II RRM
Installation Guidelines

Mounting:

- Do not mount the RRM to structures subject to vibration and shock, such as piping and piping supports.
- Do not locate the RRM 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 RRM so it can be easily accessed for service and routine testing.
- Make sure the RRM is not blocked; otherwise front panel is difficult during installation and service.
- The RRM has four mounting holes; securely mount the instrument to a wall or support using appropriate hardware.

Wiring Connections:

Before putting a ZGARD CX II RRM into operation, determine the current switching requirements of the relays and the attached load. Make sure the load current does not exceed the switching capability of the relays. Also refer to the ZGARD CX II RRM Installation Outline drawing located in the back of this manual, which provides important information regarding;

- Operating power.
- Relay wiring connection.
- Required conductors and wire size.

CAUTION

1. When wiring the RRM, disconnect the main power to prevent bodily harm.
2. Do not use the RRM 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 RRM's operating power and or relay wiring.
4. Do not exceed the contact ratings marked on the relays.
5. Make sure that each RRM is given a unique address (DIP switch selected), or the ZGARD CX II Controller may not be able to communicate appropriately.
6. When connecting the RRM's, 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.
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.

Address Configuration:

The ZGARD CX II RRM requires an address to be selected on SW1 so that it can be identified by the CX-II controller. The table below shows the address switch positions and the corresponding address (displayed as 'relay card number' in the CX-II relay setup menus) as well as the relay numbers as they are identified in the CX-II relay setup menus.

SW1-1	SW1-2	SW1-3	SW1-4	Address	Relay Number in CX-II Controller
OFF	OFF	OFF	OFF	0	1,2,3,4 (same as CX-II built-in relays)
ON	OFF	OFF	OFF	1	5,6,7,8
OFF	ON	OFF	OFF	2	9,10,11,12
ON	ON	OFF	OFF	3	13,14,15,16
OFF	OFF	ON	OFF	4	17,18,19,20
ON	OFF	ON	OFF	5	21,22,23,24
OFF	ON	ON	OFF	6	25,26,27,28
ON	ON	ON	OFF	7	29,30,31,32
OFF	OFF	OFF	ON	8	33,34,35,36
ON	OFF	OFF	ON	9	37,38,39,40

Relay Fail Operation:

The ZGARD CX II RRM has an optional relay fail mode function that can set the relays to a known, user- selectable state if communication with the main CX-II controller is lost. This function has two parts: 1) enable and 2) fail state. The table below shows the various options:

SW1-5	SW1-6	Relay Operation during Communication Fail
OFF	Don't Care	All 4 relays remain in last state (default)
ON	OFF	All 4 relays de-energize
ON	ON	All 4 relays energize

Normal Relay Mode:

The ZGARD CX II RRM has an optional relay mode function that can operate the relays in a normally de-energized mode or a normally energized mode. In a normally de-energized operating mode, the relays remain de-energized until an alarm condition occurs on the CX-II at which point they become energized. In a normally energized operating mode, the relays remain energized until an alarm condition occurs on the CX-II at which point they become de-energized. The table below shows the various options:

SW1-8	Normal Relay Mode
OFF	All 4 relays normally de-energized (default)
ON	All 4 relays normally energized

Section 4

ZGARD CX II RRM
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.

General: The ZGARD CX II RRM provides additional relays to a CX-II gas controller system. These relays are completely custom programmable from the CX-II main controller as to their function. The may be used individually to provide additional outputs at a zone level or they may be grouped together to provide higher control functions. See the CX-II controller manual for more details on relay programming.

Address Configuration: The ZGARD CX II RRM uses a DIP switch selectable address so that it can be identified by the CX-II controller. Each RRM adds four (4) additional relays to the relay setup menus on the CX-II menus. The cards address is displayed as 'relay card number' in the CX-II relay setup menus.

Communication Fail: The ZGARD CX II RRM has an optional relay fail mode function that can set the relays to a known, user- selectable state if communication with the main CX-II controller is lost. This function has two parts: 1) enable and 2) fail state. The function must first be enabled via SW1-5 and then the desired relay output must be selected using SW1-6.

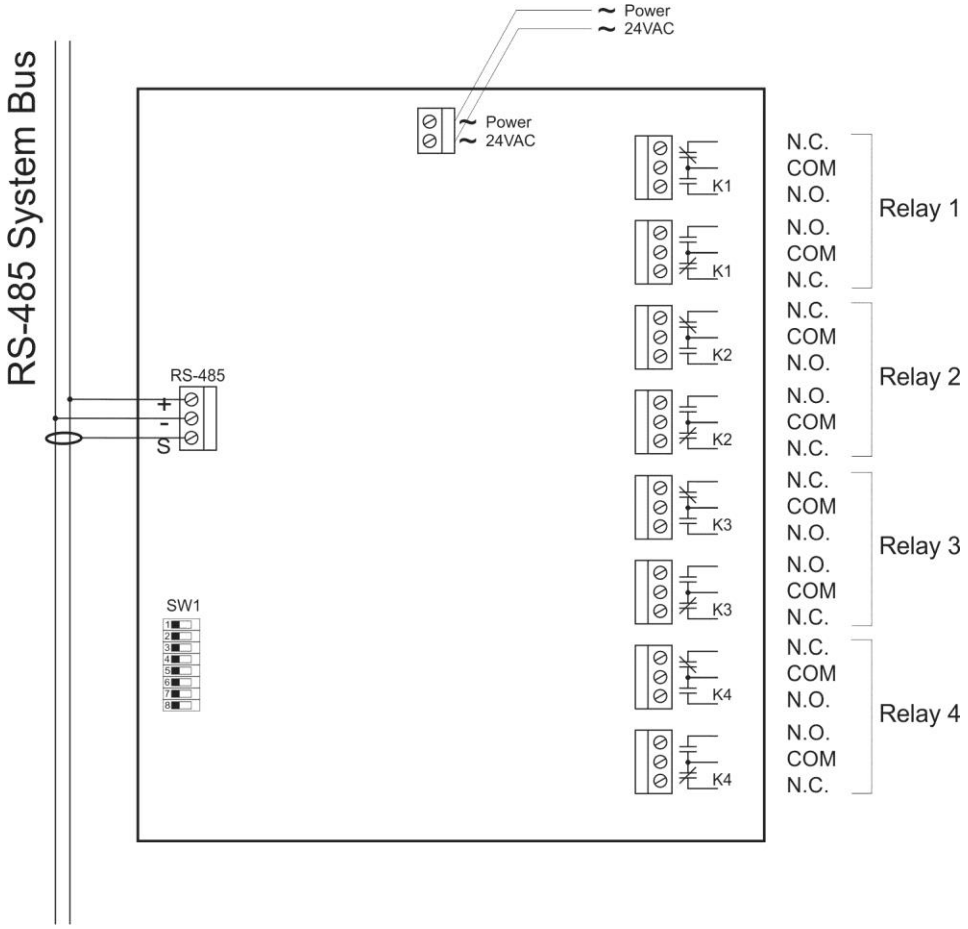
Normal Relay Mode: The ZGARD CX II RRM has an optional relay mode function that can operate the relays in a normally de-energized mode or a normally energized mode. In a normally de-energized operating mode, the relays remain de-energized until an alarm condition occurs on the CX-II at which point they become energized. In a normally energized operating mode, the relays remain energized until an alarm condition occurs on the CX-II at which point they become de-energized.

Test Mode: It is not recommended that the test mode be used except under instructions and guidance from a qualified factory representative. Enabling the test mode (SW1-7 = ON) can render the entire CX-II system inoperable and may cause false alarms or no alarms in the event of a gas presence.

The test mode turns the RRM card into an RS-485 output device by sending relay control signals on the RS-485 bus. This can be used to test another suspect RRM card.

NEVER activate the test mode while a RRM card is installed in a system.

System Diagnostics Feature: The ZGARD CX II RRM has three indicator lights on the left hand side near the bottom of the card. They are labelled 'ACTIVE', 'RX' and 'TX'. The RX and TX lights indicate data traffic on the RS-485 bus. Once a RRM card has been configured in the CX II controller and the CX II controller is sending data to the card, the ACTIVE light will blink every time it receives valid data. If communication from the CX II should become lost, the ACTIVE light will begin a slow steady flash to indicate no communication.


RS-485 System Bus
Power
24VAC
Power
24VAC
RS-485
+
-
S
SW1
K1
K2
K3
K4
N.C.
COM
N.O.
N.O.
COM
N.C.
Relay 1
Relay 2
Relay 3
Relay 4

ZGARD CX-II-B-0
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

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

ETL LISTED
CONFORMS TO
UL 61010-1-2012

Intertek
3118354

CERTIFIED TO
CAN/CSA C22.2
No. 61010-1-12

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

⚠ CAUTION

This equipment could have voltages up to 250VAC present, from other devices, in other locations

Note: Strobe Option

Powered from **24VAC** only!
Use only strobe:
INGRAM model SB1224AD

Replacement Battery

Manufacturer	Model	UL File #
Panasonic	CR2032	MH12210
Energizer	CR2032	MH29980
Sony Corp.	CR2032	MH12566

Relay Card ID & Relay Numbers

Card ID & DIP SW / Relay	0	1	2	3	4	5	6	7	8	9
K1=	1	5	9	13	17	21	25	29	33	37
K2=	2	6	10	14	18	22	26	30	34	38
K3=	3	7	11	15	19	23	27	31	35	39
K4=	4	8	12	16	20	24	28	32	36	40

Relay State On Comm. Fail (All Relays)

- Last State
- De-Energize
- Energize

Relay Card Test Mode

- Normal Mode
- Test Mode

Relay Operating Mode

- Normally De-Energized
- Normally Energized

Label Technical Information:

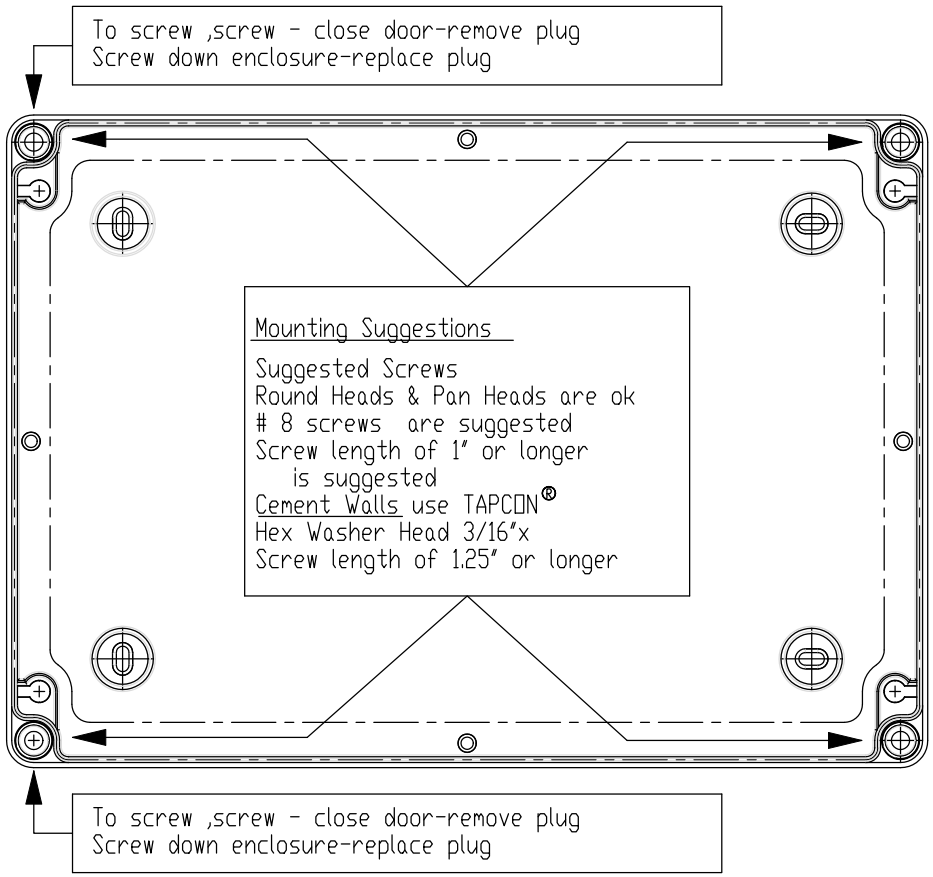
Material: 3M, 7840TL
UL Recognized: MH16411
Printer: HP LaserJet 4200
Toner: Q1338A

REV	DRN	DESCRIPTION	DATE
B	MG	Moved to Corel	Apr 1/14
A	DP	Initial Release	Feb 19/13

DATE: Feb. 19/13 DRN: DP

Zgard CX-II & ZGARD RRM
Ratings, Caution & Configuration
Labels

DWG. NO.: 108710-B



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 accessable for maintance.

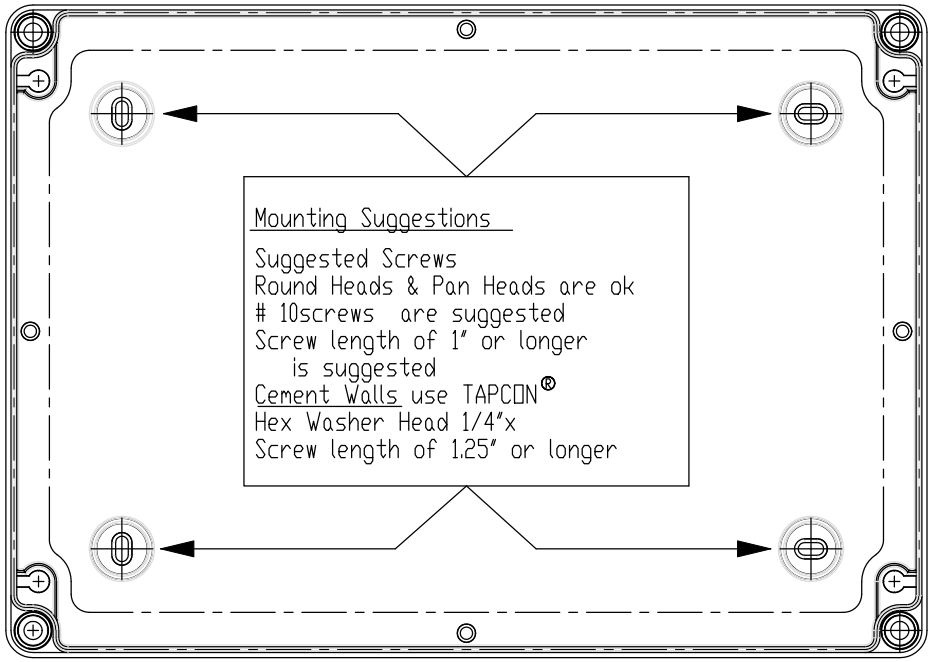
⚠ CAUTION: BONDING BETWEEN CONDUIT CONNECTIONS NOT AUTO-MATIC AND MUST BE PROVIDED AS A PART OF THE INSTALLATION.

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



MOUNTING THE UNIT

1. Do not mount the unit to structures subject to vibration and shock.
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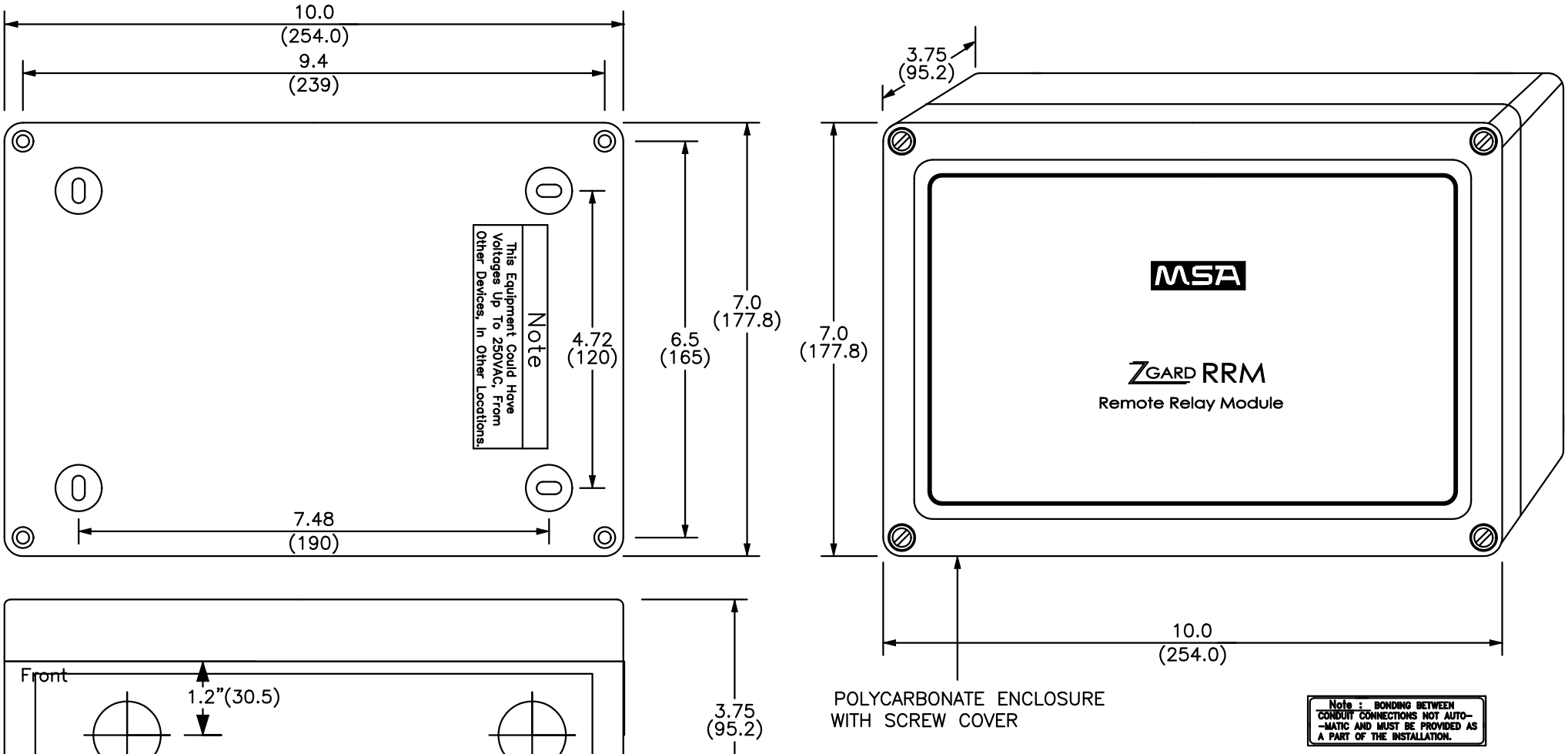
⚠ CAUTION: BONDING BETWEEN CONDUIT CONNECTIONS NOT AUTO-MATIC AND MUST BE PROVIDED AS A PART OF THE INSTALLATION.

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 govering agency.

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

Rev.D Encl. Hole Info.		
Rev.C Bonding Label		
Rev.B Conduit holes added		
MSA		
CHKD:	DATE:Jun. 26/08	DRN: MG
ZGARD RRM Remote Relay Module Enclosure & Dimensions		
DWG. NO.: 107390-2		REV. D

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

FOR DAISY-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

ZGARD SENSOR #N

ZGARD SENSOR #2

ZGARD SENSOR #1

TB1 POWER 24VAC/DC 100mA

TB2 OUTPUT RS-485 + - S

(SHIELD)

POWER 17-27VAC,50/60Hz OR 24-38VDC

WIRE REQUIREMENTS 16 Gage, 105 °C CSA or ULApproved

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 22GA (eg BELDEN NEC CMR 9322) SUPPLIED AND INSTALLED BY OTHERS

POWER 17-27VAC,50/60Hz OR 24-38VDC@0.3Amp Add Strobe AC only @ 0.7 Amps (total)

WIRE REQUIREMENTS 16 Gage, 105 °C CSA or ULApproved

RS-485 COMMUNICATION PORTS (1 - 4)
FOR EASE OF TROUBLESHOOTING, DISTRIBUTE SENSORS AMONG MORE THAN ONE PORT

I/O#1 I/O#2 I/O#3 I/O#4

+ - S

(SHIELD)

99 SENSORS MAX.

BACnet or Modbus

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

Relay Contact Rating
5 Amps, 250Vac
5 Amps, 30Vdc

WIRE REQUIREMENTS
16 Gage, 105 °C
CSA or ULApproved

RELAY #1

RELAY #2

RELAY #3

RELAY #4

Note

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

REMOTE RELAY MODULE (ZGard RRM)

WIRE REQUIREMENTS 16 Gage, 105 °C CSA or ULApproved

POWER 17-27VAC,50/60Hz OR 24-38VDC@0.3Amp Add Strobe AC only @ 0.7 Amps (total)

Relay Contact Rating
5 Amps, 250Vac
5 Amps, 30Vdc

NOTE:
RS-485 CABLE RUNS NOT TO EXCEDE 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.

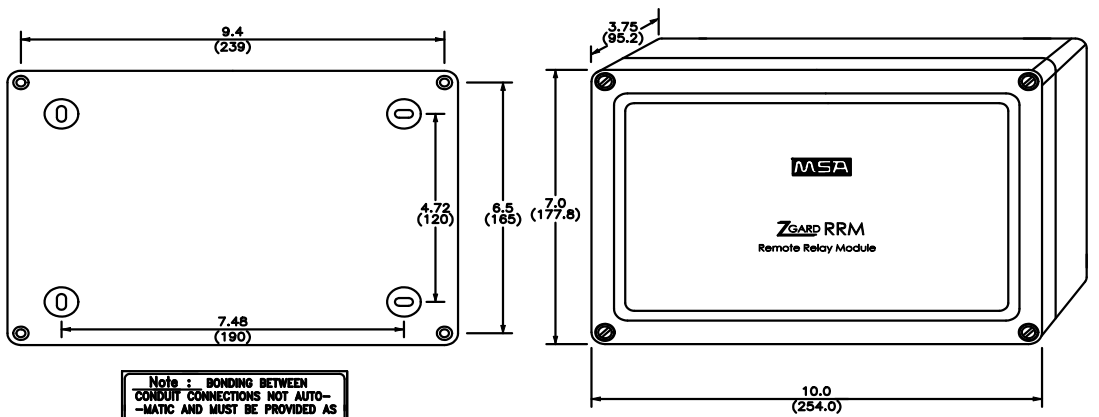
POWER 17-27VAC,50/60Hz OR 24-38VDC@0.3Amp

WIRE REQUIREMENTS 16 Gage, 105 °C CSA or ULApproved

4-20mA OUTPUT #1

4-20mA OUTPUT #2

ANALOG OUTPUT MODULE (4AO)



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

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

REV.D Cautions Removed		
REV.C PowerLabels/Relay Rating		
REV.B Sensor Wiring Changed + ZRM		
MSA		
CHKD: V.B	DATE: Jun. 26/08	DRN: D.P
ZGARD RRM Remote Relay Module Installation Outline		
DWG. NO.: 107389-2		REV. E