inovonics®

User Manual

Inovonics Intrusion System

Preliminary

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Notice

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Part Number and Revision

11.11.26 357-00094-01 Rev. A

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Technical Services Contact Information

If you have any problems with this procedure, contact Inovonics technical support:

- E-mail: support@inovonics.com.
- Phone: (800) 782-2709.

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Document Conventions

The following notices are used throughout this document:

Note: Emphasizes points, provides supplementary information, or indicates minor problems in an expected outcome.

Caution: Indicates possible damage to equipment or loss of data, as well as potential problems in an expected outcome.

Warning: Indicates the possibility of minor injury to oneself or others.

Danger: Indicates the possibility of serious or fatal injury to oneself or others.

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Chapter 1

EN6091 Gateway Mark II Overview

Note: The following describes the methods to setup the Inovonics Intrusion System for its intended functionality as an intrusion alarm system in accordance with UL 2610/UL 1023 and SIA CP-01. The remainder of this document comprises normal operations.

1.1 EN6091 Gateway Mark II Introduction

The Inovonics EN6091 Gateway Mark II is a fully integrated and modular commercial security platform designed for unmatched reliability, rapid deployment, and effortless scalability. Built on Inovonics' industry-proven EchoStream® wireless mesh network, it delivers secure, long-range communication that thrives in demanding RF environments — without the complexity of wired infrastructure. The EN6091 Gateway Mark II is a hybrid control panel supporting wired and wireless intrusion and pendant devices.

Note: For a quick reference guide of programming commands, see the *EN6091 Gateway Mark II Programming Manual*.

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1.2 EN6091 Gateway Mark II Features

Feature	Details
Wireless sensors	Inovonics EchoStream wireless devices.
Touchpad support	Supports one touchpad with battery backup.
Panel supervision	AC mains, communication, low battery, battery charger, RF jam, overcurrent.
Zones	Up to 256 supervised zones: any combination of wired and Inovonics wireless devices. Eight hardwired zones supported on panel.
Zone characteristics	Entry/exit; entry/extended exit; perimeter/instant; interior follower; trouble while disarm/alarm while armed; 24-hour silent; 24-hour audible; 24-hour auxiliary.
Arming modes	Arm away, arm stay, arm maximum.
Wired zone types	Normally closed, normally open, single EOL, double EOL, triple EOL (anti-masking and doubling).
Enclosure tamper	Front cover, rear wall.
False alarm mitigation features	Arm-stay failover, exit delay restart, exit error, recent closing, alarm abort, alarm cancel, crossed zones, swinger shutdown.
Interface(s)	One battery backed up touchpad, Android/iOS mobile application, dealer dashboard for configuration and management.
Communication	Failover support, primary wired Ethernet, secondary built-in cellular and WiFi. Built-in EchoStream radio for communication with Inovonics wireless initiating devices.
Cabinet	Removable and reversible door, battery tray accommodating two 9 Ahr sealed batteries, knockouts for 3/4” and 1” conduit, wire tiedown locations, front door and wall tamper.
Battery backup	24-hour backup load with two 9 Ah batteries: one UL-approved sounder, one touchpad, eight wired zones, 248 wireless zones. (Inovonics wireless devices are powered by their own batteries and add no load to the panel's 24-hour standby battery calculation.)

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1.3 EN6091 Gateway Mark II Compatible Devices

This Inovonics Intrusion System is designed for use with devices manufactured or approved by Inovonics. Use of unauthorized devices may cause damage or compromise the performance of your security system and affect the validity of your Inovonics limited warranty. When you purchase devices that have been manufactured or approved by Inovonics you acquire the assurance that these devices have been thoroughly tested to ensure optimum performance when used with your security system.

The following devices are recommended for use with the EN6091 Gateway Mark II:

1.3.1 Fully Compatible Inovonics EchoStream Devices

Device Type	Device
Repeater	EN5040-T high power repeater with transformer
Door/window contact	EN1210 single input universal EN1210EOL single input universal with EOL EN1215EOL universal with wall tamper
PIR motion detector	EN1262HT high traffic motion detector EN1263 motion detector with pet immunity EN1266 360° ceiling mount motion detector
Glassbreak detector	EN1248 glassbreak detector
Pendants	EN1235DF double-button fixed position hold up transmitter EN1235SF single-button fixed position hold up transmitter EN1223D double-button water-resistant pendant EN1223S single-button water-resistant pendant EN1233S single-button necklace pendant EN1233D double-button necklace pendant EN1235S single-button fixed position hold up transmitter EN1235D double-button fixed position hold up transmitter
Billtrap	EN1249 billtrap transmitter

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1.3.2 Partially Compatible Inovonics EchoStream Devices

The following transmitters will have limited functionality.

Device Type	Device
Multi-condition door/window magnet	EN1215WEOL door/window with wall tamper and EOL EN1210W door/window transmitter with reed switch
Multi-condition door/window contact	EN1212 dual input universal EN1216 dual input universal with wall tamper
Multi-condition pendants	EN1224 multiple condition pendant EN1224-ON multiple condition on/off pendant EN1236D double-button three condition pendant transmitter EN1238D double-button dual condition pendant Transmitter EN2242 three-condition duress card
Environmental	EN1752 temperature detector

- All alarms from multi-condition transmitters will be read as the same.
- When using the EN1752 temperature detector, the panel will not differentiate between high and low alarms; however, a high greater than 140°F or low less than -4°F will generate a tamper message. The EN1752 temperature detector has a programmable check-in time with a 60 minute preset. To function properly, the check-in time must be set to three minutes.

Note: For more information about programming the EN1752 temperature detector, see the EN1752 Temperature Detector Installation Instructions.

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1.3.3 Third-Party Wired Devices

Device Type	Device
Dual tech motion detector	Optex FLX-P-DT FlipX professional indoor dual-tech model, with PEU-K or discrete EOL
PIR motion detector	Optex FLX-S-ST flexible range indoor detector; FLX-A-AM indoor PIR/combination detector, with PEU-K or discrete EOL

Device Type	Device
Sounder	Honeywell System Sensor HRL, HWL, HGRL, HGWL horn; Honeywell System Sensor HRLA, HWLA, HGRLA, HGWLA horn

1.4 EN6091 Gateway Mark II Internal Components

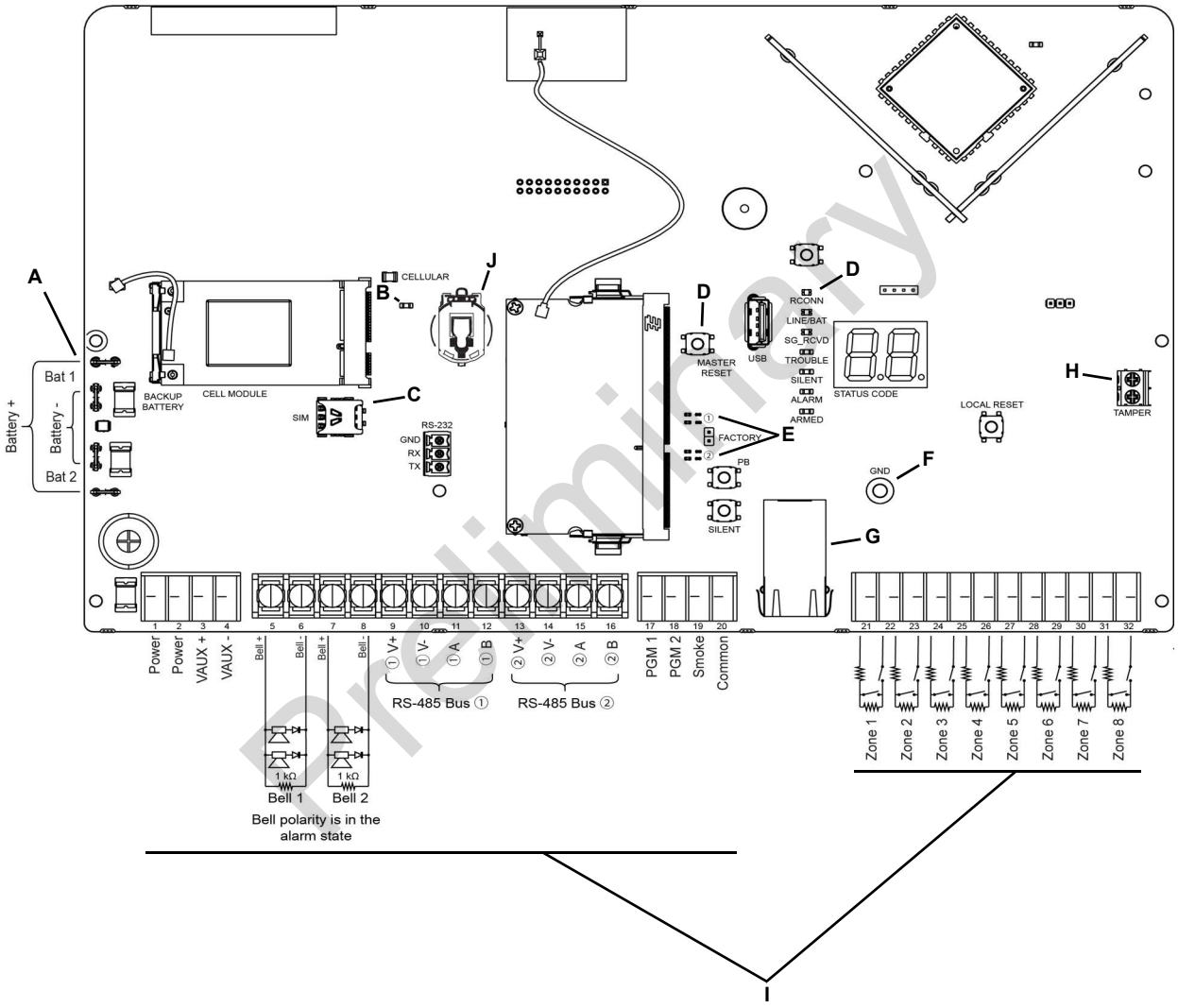


Figure 1-1 EN6091 Gateway Mark II panel components

A. Backup battery terminals	**B.** Cellular LED	**C.** Cell module SIM tray

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D. Operation LEDs	**E.** RS-485 LEDs	**F.** Panel ground
G. Ethernet port	**H.** Tamper input	**I.** Connection terminals
J. RTC battery cradle		

1.4.1 Connection Terminals

Pin Number	Pin Function	Wire Gauge
1	AC power transformer connection, 16.5 Vac RMS	16 - 22
2	AC power transformer connection, 16.5 Vac RMS	16 - 22
3	Auxiliary power output positive, +13.8 Vdc at 0.9; a maximum, resettable fuse	16 - 22
4	Auxiliary power output common	16 - 22
5	Bell circuit 1 positive in alarm condition	12 - 18
6	Bell circuit 1 negative (not a common connection)	12 - 18
7	Bell circuit 2 positive in alarm condition	12 - 18
8	Bell circuit 2 negative (not a common connection)	12 - 18
9	EchoBus; 1 +13.8 Vdc at 0.9; a maximum, resettable fuse	12 - 18
10	EchoBus 1 common	12 - 18
11	EchoBus 1 data A (also used by built-in hardwired zones)	12 - 18
12	EchoBus 1 data B (also used by built-in hardwired zones)	12 - 18
13	EchoBus 2 +13.8 Vdc at 0.9; a maximum, resettable fuse	12 - 18
14	EchoBus 2 common	12 - 18
15	EchoBus 2 data A	12 - 18
16	EchoBus 2 data B	12 - 18
17	Reserved	
18	Reserved	

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Pin Number	Pin Function	Wire Gauge
19	Reserved	
20	Common	16 - 22
Ethernet		
21	Zone 1	16 - 22
22	Common for zones 1 and 2	16 - 22
23	Zone 2	16 - 22
24	Zone 3	16 - 22
25	Common for zones 3 and 4	16 - 22
26	Zone 4	16 - 22
27	Zone 5	16 - 22
28	Common for zones 5 and 6	16 - 22
29	Zone 6	16 - 22
30	Zone 7	16 - 22
31	Common for zones 7 and 8	16 - 22
32	Zone 8	16 - 22

1.4.2 LEDs

The following LEDs are used to monitor operation:

Status	LED	Description	Condition			
			Off	On	Flash (one blink)	Blinking
ARMED	Amber	Indicates the current panel partition arming status	Zero partitions armed on panel	At least one partition armed	Reserved	Armed (First partition on panel if applicable)
ALARM	Red	Indicates the current panel partition alarm status	Zero partitions on panel in alarm	At least one partition alarmed on panel	Reserved	Going into alarm (first partition on panel if applicable)

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Status	LED	Description	Condition			
			Off	**On**	**Flash (one blink)**	**Blinking**
SILENT	Amber	Indicates if the sounder circuit is silenced; the function is automatically disabled after five minutes	Silence disabled, annunciation enabled	Enabled; annunciation silenced	Reserved	Silenced while at least one partition in alarm
TROUBLE	Red	Indicates the status of panel trouble conditions	Zero partitions on panel with a trouble condition	At least on partition on panel with a trouble condition	Reserved	Reserved
MSG_RCVD	Red	Indicates when wireless or wired messages are received/processed by the panel. Red: wireless; green: wired	No traffic on either wireless or wired path	Reserved	Wireless	Reserved
	Green				Wired	
LINE/BAT	Red	Indicates the panel power status. Red: battery; green: AC/ main	No Power	On battery	Reserved	Alternate during boot-up and shut-down
	Green			On AC/main		
RCONN	Blue	Indicates system connectivity status. Blue: CMS connectivity status; orange: IP connectivity status	No connectivity	Connected to CMS, if configured and active	Reserved	Acquiring active connection
	Orange			Connected to Cloud, if active		
ETHERNET LINK	Green	Indicates the Ethernet link speed	No Ethernet link	100 Mbps Link	N/A	N/A
	Orange			1000 Mbps Link		
ETHERNET ACTIVITY	Yellow	Indicates if the Ethernet is active	No Ethernet activity	N/A	N/A	Traffic over Ethernet
CELLULAR	Red	Indicates the status of the cellular modem	N/A	N/A	N/A	Idle: 1.8s low/ 0.2s high; NW: 0.2s low/1.8s high; traffic: 1.0s low/1.0s high
RS-485	Green	Indicates inbound/ outbound messages/traffic on the RS-485 buses	N/A	N/A	N/A	Incoming data over RS-485
	Red					Outgoing data over RS-485

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1.4.3 Buttons and Jumpers

Name	Button Description
MASTER RESET	Restarts the SOM and firmware services while maintaining panel state; reconnects.
MASTER RESET	Restarts the SOM and firmware services while maintaining panel state; reconnects.
PB	Resets the eFuse.
SILENT	Silences the sounder circuit for five minutes.
LOCAL RESET	Resets the expander module.
SW3	Resets the receiver module.
FACTORY RESET PINS	Resets the panel to factory defaults. For more information, see section 3.2, “Factory Resetting the Panel” on page 40.
BEEPER	Beeps locally if the panel is disconnected from AC/mains power; provides an optional CMS acknowledgment signal for arm/disarm if connected.

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Chapter 2

Installation and Setup

2.1 Installation Warnings and Cautions

Failure to follow the warnings and cautions below can cause damage to the equipment, improper operation of the system, or physical harm to the user.

Warning: Risk of electric shock. Ensure that all electrical power has been removed from the panel before updating the wiring. Unplug the power supply and disconnect the backup battery.

Warning: Risk of electric shock. Disconnect power to the receptacle before installing or removing the unit. When removing receptacle cover screw, cover may fall across plug pins or receptacle may become displaced.

Caution: This system involves electrical connections and life safety equipment. While this manual provides guidance for basic installation, we strongly recommend professional installation by a security technician to ensure proper operation and compliance with local codes.

Caution: Failure to install the backup battery exactly as described in this manual may result in injury and/or permanent damage to the control panel.

Caution: The antennas in the panel used for transmitter accessories must be installed at a separation distance of at least 20 cm (7.8 inches) from any person and must not be located or operate parallel to any other transmitter or antenna, except in accordance with FCC and ISED multi-transmitter product procedures.

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Caution: This product is not designed or intended for installation outdoors or outside the protected premises.

Caution: Use only with duplex receptacle having center screw. Secure unit in place by receptacle cover screw.

Caution: Only use the wiring methods similar to the methods shown in Figure 2-1, “Recommended wiring methods for reliable operation; wiring methods shall be in accordance with the National Electrical Code (ANSI/NFPA 70), UL 681, UL 827 and Canadian Electrical Code (CSA C22.1) as applicable,” on page 16 for connections to the panel and for connections to devices connected to the panel.

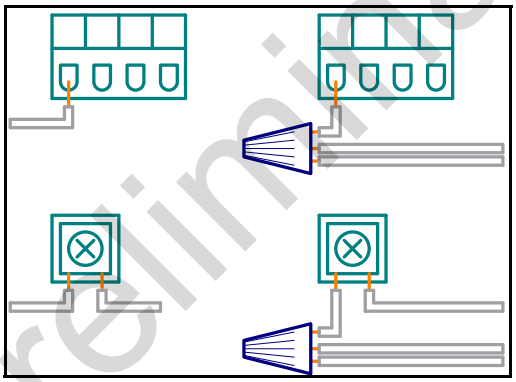


Figure 2-1 Recommended wiring methods for reliable operation; wiring methods shall be in accordance with the National Electrical Code (ANSI/NFPA 70), UL 681, UL 827 and Canadian Electrical Code (CSA C22.1) as applicable

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2.2 Installing an Inovonics Intrusion System

Inovonics EchoStream survey tools should be used to establish the Inovonics Intrusion System. EchoStream survey tools measure the signal strength and signal margin of RF messages to help optimize your EchoStream system. The signal level is the measurement of the overall decibel level of the message; the signal margin is the measurement of the decibel level of the message, minus the decibel level of any interfering signals.

Both the signal level and signal margin are measured in decibels. Because signal strength and signal margin are measured on a logarithmic scale, the difference between a decibel level of 3 (Weak) and a decibel level of 4 (Good) is a much larger difference than it would be on a linear scale.

Note: Inovonics offers two options for site surveys: the EN7017 survey kit and app and EN4016SK survey receiver. The EN4016SK survey receiver displays the decibel level, while the EN7017 survey kit and app displays only that the reception is good or weak. For more information, see the *EN4016SK Survey Receiver Installation and Operation Manual* and the *EN7017 Survey Kit and App Installation and Site Survey Instructions*.

2.2.1 RF Signal Propagation

While wood, drywall and glass usually let the RF signals pass, some materials may inhibit or attenuate radio frequency (RF) signal propagation by blocking, reflecting, deflecting or absorbing RF signals.

Consider anything between transmitters and repeaters and/or the panel. Is there concrete and steel construction? Are there earthen berms or hills? Are there a lot of trees? Devices should be mounted such that they are least affected by these elements.

For best results, transmitters and repeaters should be mounted at the optimal height to achieve line of sight to repeaters and/or the panel. Usually this means they will be mounted as high as possible.

Following are some typical obstacles to RF signal propagation:

Material	Affect	Recommendation
Metal construction, including ductwork; pipes; studs; stucco, plaster or concrete with wire mesh; satellite dishes, metal-lined rooms such as walk-in coolers or freezers; metal siding, safes, etc.	Can reflect, absorb and/or disrupt RF signals.	Perform a site survey using an Inovonics wireless survey tools to verify the RF signal is acceptable, and, when necessary, to determine where to locate repeaters.
Completely enclosed metal boxes/ enclosures.	Can restrict RF signals.	

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Material	Affect	Recommendation
Solar panels, cinder block walls, windows with built-in solar tinting.	Can absorb and/or reflect RF signals.	
Vegetation.	Can attenuate RF signals. The RF environment can alter as trees shed or sprout leaves.	Add repeaters as issues arise.
Automobile and truck traffic.	Can disrupt RF signals.	Mount Inovonics devices at a height sufficient to achieve line of sight above traffic.

2.2.2 Minimum Signal Strength

The minimum signal strength required at the receiver for normal operating performance is -100 dBm.

2.2.3 Maximum Ambient RF Noise

The maximum ambient radio-frequency noise level that can exist while still meeting the requirements of this section is -114.04 dBm.

2.2.4 RF Drop Specifications

A device is reported as dropped if the panel does not receive a supervisory message within the configured supervision window.

2.3 Install Optional Tamper Switches and Cabinet Door

Note: If a tamper switch is not installed, the tamper input on the Gateway Mark II must be shorted to prevent the panel from initializing in alarm. For the location of the tamper input, see Figure 1-1, “EN6091 Gateway Mark II panel components” on page 10.

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Note: If a tamper switch is installed, depress the switch during initialization to prevent the panel from starting in alarm.

Door/wall tamper and attachment hardware are not included with the panel. The TSW-2T Mechanical Tamper Switch with normally open contacts is approved by Inovonics for use with the cabinet.

Note: Door and wall tamper switches can be installed on either side, but the door wall tamper switch should be installed on the same side as the lock on the reversible cabinet door.

1. Align door hinge tabs to cabinet slots.
2. Lift and remove the cabinet door.
3. Install the tamper switches per the manufacturer's installation instructions.
4. Replace the cabinet door, ensuring that the door lock does not interfere with the tamper switch.
   - If the door lock interferes with the tamper switch:
     a. Open the door.
     b. Unscrew the cam on the back of the door lock.
     c. Rotate the cam 90 degrees so that the cam faces upwards when the key is rotated counterclockwise.
5. Lift and remove the cabinet door.
6. Wire the tamper switches in series to the tamper input shown in Figure 1-1, "EN6091 Gateway Mark II panel components" on page 10.

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2.4 Install the RTC Battery

1. Remove CR2032 coin cell battery from the accessory pack.
2. Install the CR2032 coin cell battery in the RTC cradle.

2.5 Mount the EN6091 Gateway Mark II

Caution: Mount the panel in a location away from metal. Metal objects (duct work, wire mesh screens, boxes) will reduce RF range.

Note: A best practice is to ensure the panel is mounted in an easily accessible location for future maintenance.

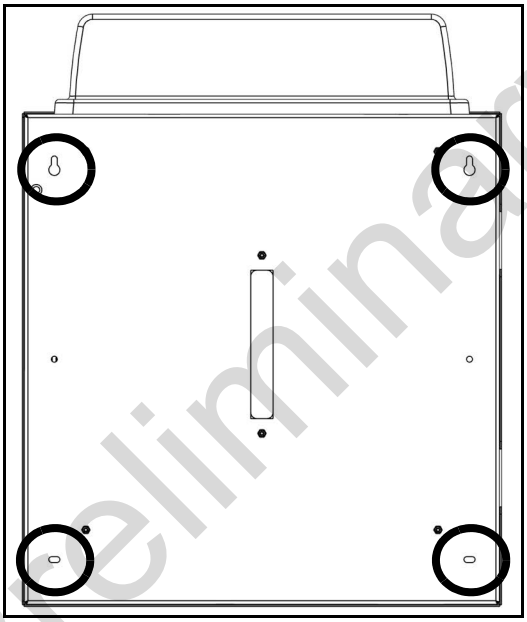


Figure 2-2 Panel mounting holes

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1. Using a level, pin the mounting template to the wall.
2. Mark mounting locations.
3. Use a 1/4” drill bit to drill pilot holes.
4. Use a #2 Phillips screwdriver to install included wall anchors.
5. Install washers on two of the included Phillips screwdriver.
6. Use a #2 Phillips screwdriver to drive the top two screws into the wall, leaving room to hang the panel.
7. As desired, cut a hole for rear wiring.
8. Hang the panel.

9. Install washers on two of the included Phillips screwdriver.
10. Use a #2 Phillips screwdriver to attach the cabinet to the wall with the two bottom screws.

2.6 Connect Power Supply

Warning: Risk of electric shock. Disconnect power to the receptacle before installing or removing the unit. When removing receptacle cover screw, cover may fall across plug pins or receptacle may become displaced. Use only with a duplex receptacle having center screw. Secure unit in place by receptacle cover screw.

Caution: Do not mount the transformer to a receptacle that is controlled by a switch.

Caution: Conductors between the transformer and control panel must be 18 AWG or larger to ensure proper function of the transformer built-in short circuit protections.

The control panel is supplied with an Inovonics AC transformer with provision for securing with a screw to a standard NEMA 5-15R receptacle. If secured, the control panel will annunciate a local audible trouble tone if the transformer is inadvertently unplugged or the branch circuit deenergized.

Note: Securing the transformer to the receptacle is recommended, but is not required by UL 2610 or UL 1023.

Because the control panel will annunciate an audible trouble tone if the transformer is inadvertently unplugged or the branch circuit deenergized, the transformer should be located in the same room as the control panel.

Connect the panel AC power transformer per the following specifications:

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2.6.1 AC Transformer Specifications

The AC power transformer is UL 1310 Listed (UL file E189182), Class 2 (dry) / Class 3 (wet). The internal power supply of the control unit is evaluated as part of the EN6091 Gateway Mark II UL 2610 and UL 1023 Listing.

AC Transformer: Inovonics Model ACC615, P/N 112-00001-01, UL Listed (E189182), Class 2 (dry) / Class 3 (wet); input 120 Vac, 60 Hz, 48 VA; output 16.5 Vac @ 2424 mA.

Description	**Value**
Primary	
Input Voltage	120 V_{ac} RMS +10%/-15%
Input Frequency	60 Hz ±3 Hz
Rating	48 VA
Protection	115 C Thermal Fuse
Insulation	2500 Vac RMS
Connection	NEMA 1-15P
Secondary	
Output Voltage	16.5 Vac RMS ±5% FL
Protection	4 A Poly Fuse
Environmental	
Operating	32 to 104°F (0 to 40°C)
Storage	-22 to 185°F (-30 to 85°C)
Compliance	
Standard	UL 1310 7th Ed.

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2.6.2 Wire the AC Transformer

The minimum conductor size for cable between the transformer and control panel depends on the cable run length.

Maximum Cable Run Length Between Panel and Transformer	**Wire Gauge (AWG)**
Less than 19 ft	18

Maximum Cable Run Length Between Panel and Transformer	Wire Gauge (AWG)
Less than 31 ft	16

The maximum cable run length shown of 42 feet is based on the highest allowable voltage drop of 0.7 Vac RMS between the transformer and control panel.

To connect power:

Warning: Ensure all connections are secure before plugging transformer into the power receptacle.

1. Referring to Figure 1-1, “EN6091 Gateway Mark II panel components” on page 10 and section 1.4.1, “Connection Terminals” on page 11, connect the power cabling to the power panel’s connection terminals.
2. Route cabling through the rear cabling pass-through or side cabling knockouts.
3. Connect power cabling to the power transformer.
4. Plug the transformer into the power receptacle.
5. As desired, secure the transformer with a screw to a standard NEMA 5-15R receptacle.

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2.7 Connect Backup Batteries

The panel is capable of 24-hour standby with backup batteries. Backup batteries are periodically tested to verify that they’re present and in good working order. This automated test commences six hours after exiting programming mode and repeats every six hours for a period of 10 minutes per test. Entering test mode will also automatically start the battery test cycle.

Backup batteries must be 12 V 9 Ah sealed lead-acid and must physically fit in the enclosure. Two batteries may be installed in the battery tray.

24-hour backup load with two 9 Ah batteries: One UL-approved sounder, one touchpad, eight wired zones, 248 wireless zones.

Note: The panel features built-in battery reverse polarity and short protection in case it is accidentally wired incorrectly.

2.7.1 Battery Supervision

The panel automatically tests the backup batteries to verify they are present and in good working order. The test begins six hours after exiting programming mode and repeats every six hours for a period of 10 minutes per test; entering test mode also starts a battery test cycle. Battery voltage is monitored continuously: a low-battery trouble is annunciated at 11.2 Vdc, and the panel disconnects the battery at the 9.6 Vdc cutoff to prevent deep discharge. The charger supplies 660 mA and recharges two 9 Ah batteries to required standby capacity within 48 hour after an extended power loss (UL 2610 §57.5.4). The battery input is protected against reverse polarity and short circuit.

2.7.2 Battery Back-Up Timetable

Battery Configuration	Usable Capacity	Approx. Standby Time at Rated Load
One 12 V 9 Ah	9 Ah	~15 hours
Two 12 V 9 Ah	18 Ah	~31 hours

2.7.3 Battery Calculation Worksheet

Load	Qty	Unit current	Subtotal
Panel (quiescent, incl. touchpad)	1	540 mA	540 mA
Touchpad (battery-backed)	1	250 mA	included in panel
Hardwired zones (8 total)	8	15 mA total	15 mA
Aux / RS-485	—	(by installer)	____ mA
Standby total I(standby)			555 mA
Sounder(s) in alarm	1	110 mA	110 mA
Alarm total I(alarm) (standby + sounder)			665 mA

Standby runtime = battery capacity (Ah) ÷ standby current (A).

Two 9 Ah = 18 Ah ÷ 0.555 A = 32.4 h (meets 24-hour standby).

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Required capacity (Bosch/Honeywell/NFPA) = (I_standby × standby hours) + (I_alarm × alarm hours), then add 10% contingency:

= (0.555 A × 24 h + 0.665 A × 0.067 h) × 1.1 = 14.7 Ah required - met by two 9 Ah (18 Ah).

To install batteries:

1. Place batteries in the battery tray.
2. Attach battery one, using included battery wires.
   - Black wire to negative battery terminal.
   - Black wire to top negative panel terminal.
   - Red wire to positive battery terminal.
   - Red wire to top positive terminal.
3. Attach battery two, using included battery wires.
   - Black wire to negative battery terminal.
   - Black wire to bottom negative panel terminal.
   - Red wire to positive battery terminal.
   - Red wire to bottom positive terminal.
4. As desired, secure batteries using zip ties.

2.8 Connect Safety Grounds

The transformer is constructed with double insulation, but the possibility that external wiring could be crossed with a hazardous live circuit requires connection of a protective ground. The panel has multiple protective grounds.

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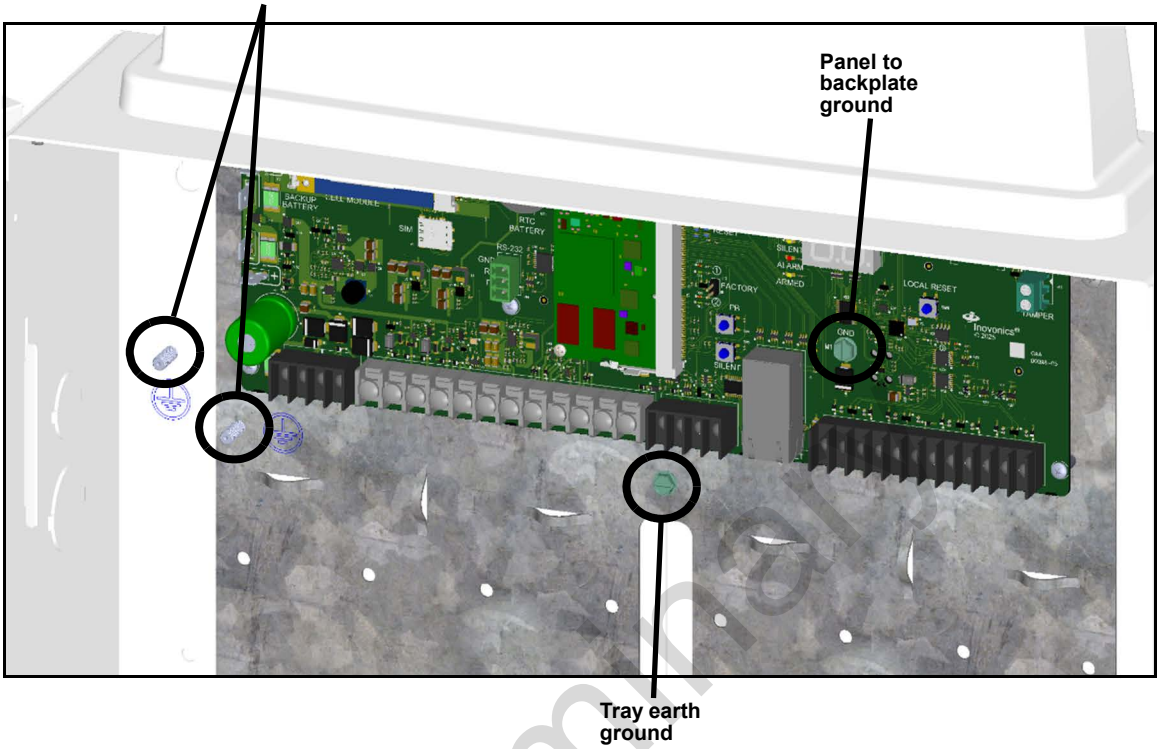


Figure 2-3 Protective ground locations

Caution: Ensure ground compatible hardware is used to install grounding line for safety earth ground studs.

Crossed-line protection shown ensures that the panel circuits cannot become hazardously energized in the event of an accidental line cross.

Caution: The safety ground conductor size shall be based on the rating of the branch circuit overcurrent device protecting the equipment, and in no case smaller than 14 gauge. Splices shall not be used in ground bond conductors.

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2.9 Connect Ethernet

Inovonics recommends modern gigabyte networking connection for the panel.

To connect Ethernet:

1. Route cabling through the rear cabling pass-through or side cabling knockouts
2. Referring to Figure 1-1, “EN6091 Gateway Mark II panel components” on page 10 and section 1.4.1, “Connection Terminals” on page 11, connect Ethernet to panel’s Ethernet port.
3. Connect Ethernet cable to your Ethernet network.

2.10 Connecting Through a Firewall

To ensure a connection through a firewall, verify the following for your router:

- The router must assign addresses via DHCP.
- The DHCP lease of the router must be set to a non-zero and non-infinite value, and should be set to a value greater than 30 seconds.
- The router must allow outbound connections on the ports below to connect through the firewall:
  - DNS (UDP 53).
  - HTTPS (TCP 443).
  - NTP (UDP 123).
  - HTTPS (TCP 9000)
- Ensure the network is not double NATed, where traffic is flowing through multiple routers that are doing network address translation.

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2.11 Connect Hardwired Zones

The panel natively supports eight hardwired zones and five contact circuit topologies.

Caution: Only use UL listed initiating devices for UL installations.

2.11.1 Zone Input Specifications

The following specifications apply to each hardwire supervised zone input, per end-of-line resistor topology (SEOL-NC, DEOL-NC, TEOL-NC) and EOL resistor value:

Maximum loop voltage (open loop) = 12 V. Allowable EOL resistors (±5%): SEOL-NC and DEOL-NC = 1.0 k, 2.0 k, 2.2 k, 4.7 k, 5.6 kΩ; TEOL-NC = 1.0 k/ 2.0 kΩ or 2.2 k/4.7 kΩ. Maximum wire loop (round-trip) resistance = 100 Ω. Resistance below is a multiple of the EOL value R; trip thresholds include ~5% hysteresis to prevent toggling.

SEOL-NC/DEOL-NC

Zone type	1.0 k	2.0 k	2.2 k	4.7 k	5.6 k
SEOL-NC	3.59 mA	1.92 mA	1.76 mA	NA	NA
DEOL-NC	3.59 mA	1.92 mA	1.76 mA	0.85 mA	0.72 mA

TEOL-NC

TEOL-NC configuration	Maximum loop current
1.0 k / 2.0 kΩ	2.41 mA
2.2 k / 4.7 kΩ	1.17 mA

State (SEOL-NC)

State (SEOL-NC)	Terminal voltage (V)	Zone resistance (× R)
Loop shorted / Fault	0.0 – 1.4	0 – 0.35 R
Loop normal	1.4 – 8.3	0.45 – 2.25 R
Loop open / Alarm	8.5 – 12.0	open (≥ 2.35 R)

State (DEOL-NC)

State (DEOL-NC)	Terminal voltage (V)	Zone resistance (x R)
Loop shorted / Fault	0.0 - 1.8	0 - 0.45 R
Loop normal	2.2 - 5.7	0.55 - 1.45 R
Alarm	6.1 - 9.8	1.55 - 2.51 R
Loop open / Tamper	10.2 - 12.0	2.61 - 3.07 R

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State (TEOL-NC, EOL = 1.0 k / 2.0 kΩ)

State (TEOL-NC, 1.0 k / 2.0 kΩ)	Terminal voltage (V)	Zone resistance (x R)
Loop shorted / Fault	0.0 - 1.5	0 - 0.6 R
Loop normal	1.8 - 4.0	0.7 - 1.6 R
Alarm0	4.3 - 6.5	1.70 - 2.60 R
Alarm1 / Mask	6.8 - 9.0	2.70 - 3.60 R
Loop open / Tamper	9.3 - 12.0	3.7 - 4.8 R

State (TEOL-NC, EOL = 2.2 k / 4.7 kΩ)

State (TEOL-NC, 2.2 k / 4.7 kΩ)	Terminal voltage (V)	Zone resistance (x R)
Loop shorted / Fault	0.0 - 1.3	0 - 0.5 R
Loop normal	1.6 - 3.8	0.6 - 1.5 R
Alarm0	4.1 - 6.4	1.6 - 2.5 R
Alarm1 / Mask	6.6 - 9.6	2.6 - 3.8 R
Loop open / Tamper	9.8 - 12.0	3.8 - 4.8 R

2.11.2 Wiring Resistance and Capacitance

Wire Gauge (AWG)	Maximum Run Length at 20 pF/ft (ft)	Maximum Run Length at 25 pF/ft (ft)	Maximum Run Length at 30 pF/ft (ft)	Maximum Run Length at 35 pF/ft (ft)	Maximum Run Length at 40 pF/ft (ft)	Maximum Run Length at 50 pF/ft (ft)	Maximum Run Length at 60 pF/ft (ft)
22	3100	3100	3100	3100	3100	3000	2500
20	5000	5000	5000	4300	3800	3000	2500
18	7500	6000	5000	4300	3800	3000	2500

The maximum cable run length shown is based on the shorter of either the maximum cable round-trip resistance of 100 Ω or the maximum total cable capacitance of 150 nF. Inovonics does not recommend using shielded cable for wired contacts or devices.

Preliminary

2.11.3 Normally Open and Normally Closed Zones

Note: Do not use normally open or normally closed zones for UL listed installations.

2.11.3.1 Normally Open and Normally Closed Zones with Single EOLR

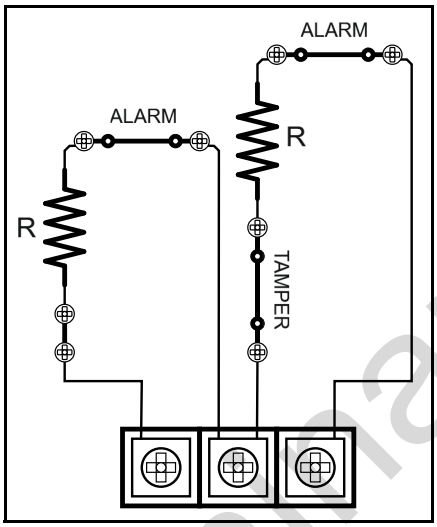


Figure 2-4 Normally closed with single EOL schematic diagram

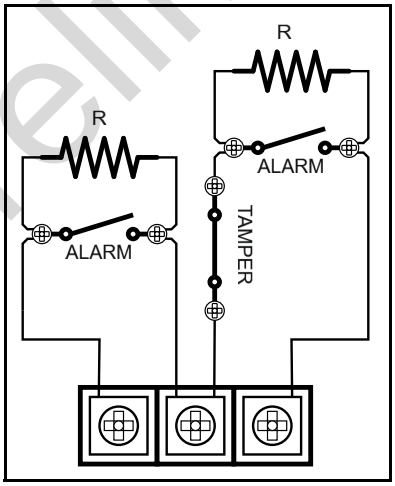


Figure 2-5 Normally open with single EOL schematic diagram

Preliminary

2.11.3.2 Normally Closed Zone with Double EOLR

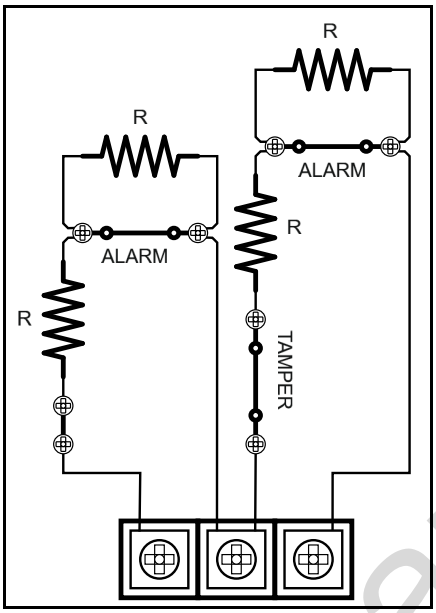


Figure 2-6 Normally closed with double EOL schematic diagram

Preliminary

2.11.4 Triple EOL Balanced

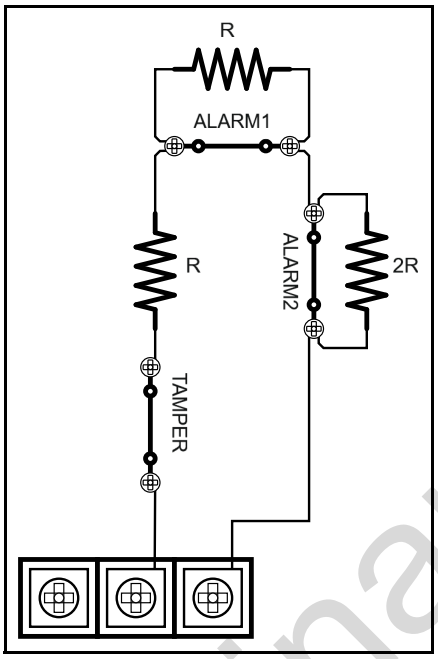


Figure 2-7 Normally closed triple EOL balanced with tamper switch schematic diagram

2.11.5 Triple EOL Anti-Masking Zone

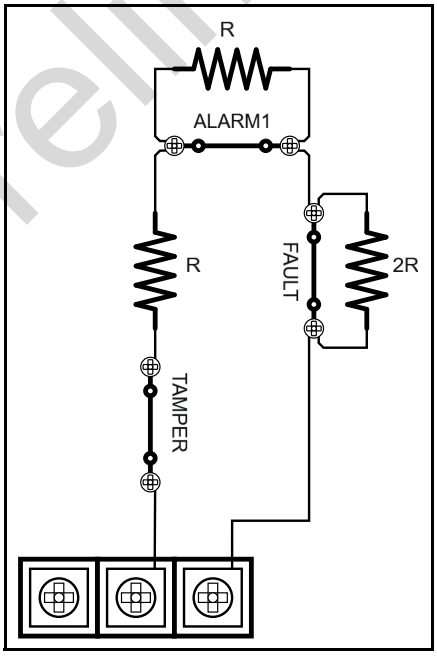


Figure 2-8 Anti-masking zone schematic diagram

Preliminary

To connect hardwired zones:

1. Referring to Figure 1-1, “EN6091 Gateway Mark II panel components” on page 10 and section 1.4.1, “Connection Terminals” on page 11, connect the hardwired device wiring to the appropriate zone terminals per the device instructions.
2. As necessary, connect wiring to one of the common grounds.
3. Route cabling through the rear cabling pass-through or side cabling knockouts.
4. Connect wiring to the device.

2.12 Connect Annunciation Devices

Caution: Use only UL listed sounding devices.

Caution: The sounding device must be a UL listed audible signal appliance rated to operate in a 10.2-13.8 VDC voltage range and must be mounted indoors.

2.12.1 Bell Circuit Specifications

Specification	Value
Number of bell circuits	2
Output voltage	10.2VDC - 13.8VDC (supplied from batteries)
Maximum current per circuit	600 mA (0.6A)
Output type	DC only (no tone generation)

2.12.2 Battery Requirement

The bell circuits draw power from the panel batteries. Batteries must be installed to drive standard sirens.

Without batteries installed, the bell circuits can only drive sounders with very low current draw, such as the Honeywell WAVE2EX.

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2.12.3 Minimum Wire Length

Sirens draw high peak current at startup. The impedance of the connecting wire limits this inrush current to a level the bell circuit drivers can handle safely.

Caution: Sounder wiring must be at least 10 feet long.

Runs shorter than 10 feet allow the sounder to draw current too quickly, which overheats the bell circuit drivers. Runs of 10 feet or more slow the inrush and allow the sounder to operate normally. If the sounder is mounted close to the panel, coil the excess wire to maintain the 10 feet minimum.

Other wiring considerations such as increased thickness (gauge) and stranded/solid core wire may apply in certain applications depending on the requirements of the siren specified. Installers are encouraged to reference the specifications in this sheet as well as the datasheets for the application sirens to determine these parameters.

2.12.4 Device Compatibility

Most sirens marketed as 15 W are compatible. The 15 W rating is an industry designator rather than a true power specification, and in DC burglary applications these sirens often specify much lower operating and peak current. For example, the DSC 15W-ULF only draws 404mA at 12VDC despite the 15 watt designation.

Before installing, confirm that the device's operating voltage, operating current, and peak current in the manufacturer's datasheet fall within the bell circuit specifications above.

2.12.5 Strobes and Multiple Devices

Strobes can also be powered from the bell circuits. Strobes must meet the same power limitations as sirens.

Multiple sirens and strobes can be connected to a single bell circuit, provided the combined current draw of all devices on that circuit stays within the 600 mA limit. Add the operating current and the peak current of each device separately, and confirm both totals are within the limit.

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2.12.6 Tested Devices

The following devices have been tested with batteries installed and a wire run of at least 10 feet:

Manufacturer	Model	Result
Honeywell	WAVE2EX	Operates normally (also supported without batteries)
Honeywell	WAVE2	Operates normally
DSC	15W-ULF	Operates normally

2.12.7 Speakers Are Not Supported

The bell circuits supply DC power only and do not generate a tone. They cannot drive speakers. Use self-contained sirens with a built-in tone generator.

2.12.8 End-of-Line Resistors

A 1kohm EOL resistor must be used for supervision when installing a sounder.

DS1 line resistances (test values):

Sounder-to-panel line resistance = 58 ohms.

Keypad-to-panel line resistance = 8.3 ohms.

Wire gauge (AWG)	Resistance /1000 ft (Ω)	2-conductor (Ω)	Max sounder run @ 60 mA (ft)
16	4.016	8.032	7263
18	6.385	12.77	4568
20	10.15	20.3	2874
22	16.14	32.28	1807
24	25.67	51.34	1136

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2.12.9 Voltage across Bell Outputs

Condition (AC mains Present)	V_{BELL+} - V_{BELL-}* (Vdc)
Disabled	-1 to +1
Standby	Pulsed (no continuous voltage)
Short	0
Open	10 to 14
Burglary	+10 to +14

**With 1k Ohm EOL resistor across last sounder in the chain.*

2.12.10 Bell Supervision Operating Modes

Condition	Bell Supervision
AC Mains OK	Continuous
On Battery, Door Open	Continuous
On Battery, Door Closed	Polled

2.12.11 Annunciation Device Connections

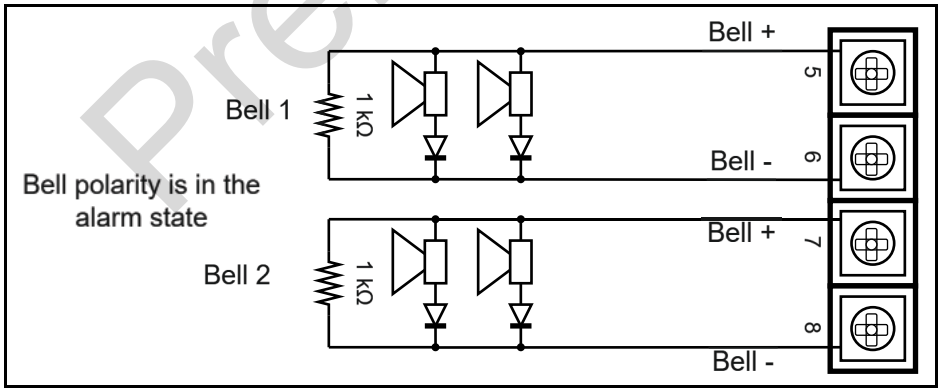


Figure 2-9 Sounder connection schematic

To connect annunciating devices:

1. Referring to Figure 1-1, “EN6091 Gateway Mark II panel components” on page 10 and section 1.4.1, “Connection Terminals” on page 11, connect

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the sounder wiring to the appropriate zone terminals per the device instructions.

- Ensure a 1kohm EOL resistor is installed for supervision.

2. Route cabling through the rear cabling pass-through or side cabling knockouts.
3. Connect wiring to the sounder.

2.13 Connect Inovonics Control Bus Devices

Note: For UL 1023 installations, the touchpad and all RS-485 bus connected devices must be installed within the same room as the control unit.

The panel provides two outputs for Inovonics control bus RS-485 devices. Each RS-485 bus is a two-wire differential bus (data A and data B). Use unshielded twisted-pair cable; shielded cable is not recommended because the shield can introduce ground loops and signal reflections that interfere with bus communication.

Secondary power supply wiring: to extend a bus, install a listed 12 VDC power supply at the far device, connect its output to the device power terminals, and bond the secondary supply ground to the panel ground. See Figure 2-3, “Protective ground locations” on page 26.

RS-485 bus cabling is restricted to 100 feet or less per bus to comply with UL 1023.

To connect an RS-485 device:

1. Referring to Figure 1-1, “EN6091 Gateway Mark II panel components” on page 10 and section 1.4.1, “Connection Terminals” on page 11, connect the device wiring to the appropriate zone terminals per the device instructions.
2. Route cabling through the rear cabling pass-through or side cabling knockouts.
3. Connect wiring to the device.

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2.14 Program Hardwired Devices and Register Inovonics Wireless Devices

For instructions on programming hardwired devices, as well as registering Inovonics wireless devices, see the *Inovonics Intrusion System Programming Manual*, available at inovonics.com.

2.15 Perform a Walk Test

Note: For instructions on setting the Inovonics Intrusion System in test mode, see the *Inovonics Intrusion System Programming Manual*, available at inovonics.com.

1. Perform a walk test, activating each device assigned to the panel and ensuring a good signal.

Caution: Always test the system for operation upon completion of the installation.

2.16 Secure the Housing

1. Affix the included summary of connections placard to the housing door in the correct orientation.
2. Replace the housing door.
3. Lock the housing door.
4. As desired, secure the door shut on one or both sides with #8 sheet metal screws.

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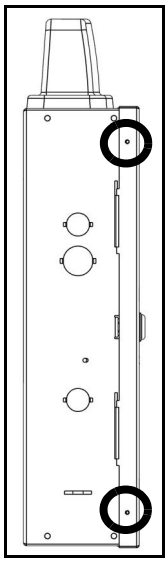


Figure 2-10 Secure the housing (left side shown)

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Chapter 3

Testing and Troubleshooting

3.1 Testing the System

3.1.1 Walk Test

Once a week, perform a walk test, activating each device assigned to the panel and ensuring a good signal.

3.1.2 Communications

Once a week, ensure that alarms reach their intended recipient.

Note: Instructions for setting the panel into test mode can be found in the *Inovonics Intrusion System Programming Guide*.

3.2 Factory Resetting the Panel

Caution: Restoring factory defaults will erase all current settings for the panel.

To restore the panel to factory defaults.

1. Power off the panel.
2. Referring to 1.4, “EN6091 Gateway Mark II Internal Components” on page 10, place a jumper on the factory reset pins.
3. When the Reset message appears on the eight-segment display, remove the jumper from the factory reset pins.

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3.3 Troubleshooting

Condition	Recommended Action
No AC power (LINE/BAT LED red)	Verify the transformer is plugged in and the branch circuit is energized; check the transformer fuse.
Trouble condition (TROUBLE LED on)	Check for a faulted zone or a low backup battery; view System Status on the touchpad for trouble condition.
No central-station connectivity (RCONN off)	Verify Ethernet, then confirm cellular/WiFi failover.
Low-battery (TROUBLE LED on; low battery indicated in System Status)	Replace the backup battery with a 12 V 9 Ah sealed lead-acid battery.
Bell does not sound in alarm	Verify a backup battery is installed and connected and that a 1 k? EOL resistor is installed across the last sounder.

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Chapter 4

Specifications and Regulatory

4.1 Gateway Mark II Specifications

Specification	Details
Firmware updates	Mender.
Firmware version	1.0.0 or later.
Auxiliary power	16.5 Vac RMS 48 VA.
Arming modes	Disarmed; arm away; arm stay; maximum.
Additional ports	Two designated sounder/strobe outputs with supervision; two designated outputs for triggering other devices.
Power supply	Input: 120 Vac 60 Hz 48 VA; output: 16.5 Vac 2424 mA.
Back up battery	Supports dual 12 V 9 Ah batteries; batteries must be installed for sounder to operate; panel does not start up on battery alone.
Battery type	Sealed, rechargeable, lead acid.
Battery protection	Self-resetting, PTC fuses.
Battery charger	Charge current 660 mA; recharges two 9 Ah to standby capacity within 48 h (UL 2610 §57.5.4).
Battery low threshold	11.2 Vdc.
Battery cutoff voltage	9.6 Vdc.
EOL resistance Values	1000 Ω; 2000 Ω (default); 2200 Ω; 4700 Ω; 5600 Ω, selectable, 5% tolerance or better.

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Specification	Details
Bell output	All low-voltage outputs (auxiliary power; RS-485 bus 1 and 2, Bell 1, Bell 2, and PGM 1-3) are power-limited; BELL1 and BELL2 limited to 0.9 A each and 1.8 A total; short circuit on one output does not affect the other; opens or shorts generate a trouble message; back up battery must be installed for output to operate.
PGM 1 and 2	1 kΩ to ground or 5 kΩ to 13 Vdc; over/under voltage protected; impedance protected.
PGM 3	Maximum 1.5 A to ground; over/under voltage protected; no over-current protection.
RS-485_1, RS-485_2, & Vaux	13.5 Vdc 0.9 A each; ripple less than 20 mV RMS; total current draw not to exceed 1.1 A from all three outputs; short circuit on one output does not affect the others; electronic fuse requires manual reset when tripped.
Misc	Troubleshooting code; local sounder for power loss notification.
Operating temperature	32°F to 120°F (0°C to 49°C); 93% relative humidity; the control panel and power supply are intended for use in dry, indoor, locations within the protected premises.
Dimensions	16.2" x 20" x 4.5".
Weight	18 lbs (8.2 kg) without batteries; ~30 lb (13.6 kg) with two 9 Ah.
Network	WiFi 802.11 b/g/n 2.400-2.485 GHz; Ethernet 100/1000 Mbps; cellular LTE CAT 1 bis (Bands 2, 4, 5, 12, 13, 66).
Supervision intervals for PSDN	200 seconds in.
Regulatory certifications	UL 2610 2nd Ed. Commercial Premises Security Alarm Units and Systems Central Station, Proprietary, Police Station, Hold-up, and Local UL 1023 Household Burglar-Alarm System Units ANSI/SIA CP-01 2019 Security System Standard - Features for False Alarm Reduction CSFM Listed FCC Part 15 Class B, CAN ICES-003(B)/NMB-3(B) Contains FCC ID: HCQ3B6F; contains IC: 2309A-F Contains FCC ID: TFB-1003; contains IC: 5969A-1003 Contains FCC ID: XMR2023EG915QNA; contains IC: 10224A-023EG915QNA Contains FCC ID: RI7xxxxxxxx; contains IC: 5131A-xxxxxxxx

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4.2 Regulatory Standards

4.2.1 Performance Standards

- Household Burglar-Alarm System Units [UL 1023 7th Edition R:July 21, 2025]
- Commercial Premises Security Alarm Units and Systems [UL 2610 2nd Edition R: January 31, 2023]
- Security System Standard - Features for False Alarm Reduction [ANSI/SIA CP-01:2019]

4.2.2 Installation Standards

- Installation and Classification of Burglar and Holdup Alarm Systems [UL 681 15th Edition R:September 25, 2025]

4.2.3 UL Residential/Commercial Burglary

Refer to UL 681 Installation and Classification of Burglar and Holdup Alarm Systems and local AHJ requirements when installing residential or commercial burglary systems in the US.

Note: Inovonics commercializes products utilizing open source third party software. For additional information, please visit: https:// www.inovonics.com/support/embedded-third-party-licenses/.

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4.3 Regulatory Statements

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

4.3.1 CLASS B DIGITAL DEVICE STATEMENT

This equipment has been tested to FCC requirements and has been found acceptable for use. The FCC requires the following statement for your information:

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- If using an indoor antenna, have a quality outdoor antenna installed.
- Reorient the receiving antenna until interference is reduced or eliminated.
- Move the radio or television receiver away from the receiver/control.
- Move the antenna leads away from any wire runs to the receiver/control.
- Plug the receiver/control into a different outlet so that it and the radio or television receiver are on different branch circuits.
- Consult the dealer or an experienced radio/TV technician for help.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

4.3.2 FCC Part 15 and Canada ISED Compliance

This device complies with part 15 of the FCC Rules, and ISED license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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Caution: Inovonics supports recycling and reuse whenever possible. Please recycle these parts using a certified electronics recycler.

Note: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: Inovonics commercializes products utilizing open source third party software. For additional information, please visit: https://www.inovonics.com/support/embedded-third-party-licenses/.

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