MAGNUM DIMENSIONS

CMW3012H

Modified Sine Wave Inverter

Owner's Manual

Thank you from all of us at Sensata for purchasing this CMW3012H inverter. The CMW3012H is under the Magnum-Dimensions brand from Sensata Technologies. We understand that you have many purchasing options in the marketplace and are pleased that you have decided on this product.

At Sensata, we are committed to providing you with quality products and services, and hope that your experience with us is pleasant and professional.

Disclaimer of Liability

Since the use of this manual and the conditions or methods of installation, operation, use and maintenance of the CMW3012H inverter is beyond the control of Sensata Technologies, this company does not assume responsibility and expressly disclaims liability for loss, damage or expense, whether direct, indirect, consequential or incidental, arising out of or in any way connected with such installation, operation, use, or maintenance.

Note as well that while every precaution has been taken to ensure the accuracy of the contents of this manual, the specifications and product functionality may change without notice. Sensata assumes no responsibility for errors or omissions.

Restrictions on Use

The CMW3012H inverter may only be used in life-support devices or systems with the express written approval of Sensata Technologies. Failure of the CMW3012H inverter can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system. If the CMW3012H inverter fails, it is reasonable to assume that the health of the user or other persons may be endangered.

Copyright Notice

Document Information

Description – CMW3012H Owner's Manual
Part Number and Revision – 64-0078 Rev A
Date Published – August 2015

This manual is printed without color for cost savings. However, this entire manual is available with many of the figures in color and can be downloaded at www.Magnum-Dimensions.com.

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Record the unit's model and serial number in case you need to provide this information in the future. It is much easier to record this information now, instead of trying to gather it after the unit has been installed.

Model:	Serial Number:
CMW3012H	BN

IMPORTANT PRODUCT SAFETY INSTRUCTIONS

This manual contains safety instructions that must be followed during the installation and operation of this product. Read all instructions and safety information on the inverter and in this manual before installing or using.

Safety Symbols

To reduce the risk of electrical shock, fire, or other safety hazard, the following safety symbols have been placed throughout this manual to indicate dangerous situations and important safety instructions.

WARNING: Indicates that failure to take a specified action could result in physical harm to the user.

CAUTION: Indicates that failure to take a specified action could result in damage to the equipment.

Info: Indicates information that emphasizes or supplements important points of the main text.

Product Safety Warnings

WARNINGS: Failure to follow the instructions below and in this manual can result in death or serious injury.

- All electrical work must be performed in accordance with local, state and federal electric codes.
- This product is designed for indoor/compartment installation. Do not expose to rain, snow, moisture, or liquids of any type.
- Use insulated tools to reduce the chance of electrical shock or accidental short circuits. Be sure to remove all jewelry such as rings, watches, bracelets, etc., when installing or performing maintenance on the inverter.
- Always disconnect the batteries prior to installing or performing maintenance on the inverter.
- Do not cover or obstruct any air vent openings and/or install in a zero-clearance compartment—always operate unit in an open area.
- When working with electrical equipment or lead acid batteries, have someone nearby in case of an emergency.
- Study and follow all the battery manufacturer's specific precautions when installing, using, and servicing the battery connected to the inverter.
- While working with batteries, wear eye protection and gloves, and avoid touching your eyes. If battery acid comes in contact with eyes, cleanse right away with soap and water for a minimum of 15 minutes.
- Batteries produce explosive gasses, DO NOT smoke or have an open spark or fire near the system.
- Avoid dropping any metal tool or object on the battery. Doing so could create a spark or short circuit which goes through the battery or another electrical tool and may cause an explosion.
- Shock Hazard! Keep away from children!
- Explosion hazard! DO NOT use this inverter in the vicinity of flammable fumes or gasses (such as propane tanks or large engines).
- These inverters contain no user-serviceable parts. See the Warranty section for how to handle service issues.

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1.0 Introduction

Congratulations on your purchase of the CMW3012H inverter. The CMW3012H is a "modified" sine wave inverter with an internal transfer switch and is sold under the Magnum-Dimensions brand from Sensata Technologies. This unit is designed to be powerful, yet simple to operate, and will provide you with reliable AC power for trouble-free use. Please read this chapter to familiarize yourself with the features and benefits of your CMW3012H inverter.

1.1 How an Inverter Works

An inverter takes direct current (DC) from your batteries and turns it into alternating current (AC)—like you use at home—to power your boat, RV, or home appliances.

1.2 What Appliances run from Modified Sine Inverters

Today's inverters come in two basic output waveforms: modified sine (which is actually a modified square wave) and pure sine. Modified sine wave inverters approximate a pure sine waveform (see Appendix D for more information).

The output of a modified sine wave inverter will run most electronic and household items—including but not limited to TV, VCR, satellite dish receiver, computers, and printers. Some devices such as rechargeable power supplies for phones, drills, and other like devices may not run or could be damaged by modified sine wave inverters. See Section 3.4 for more information on specific run times for various appliances.

1.3 Inverter Features

The front panel of the CMW3012H inverter is equipped with the following features (see Figure 1-1):

1. **AC Wiring Access Cover** – when this cover is removed, it provides access to the AC wiring terminals used to hardwire the inverter's AC output wiring (see Figure 1-2). Remove four screws (Figure 1-1, Items A) to remove the access cover.
2. **GFCI** – a 20-amp, Ground Fault Circuit Interrupter (GFCI) protected, AC outlet. This GFCI outlet quickly stops the flow of electricity in the event a ground fault occurs on the device that is plugged into the inverter.
3. **USB Port** – allows USB-enabled devices to be powered and charged (provides 5 VDC/750 mA).
4. **Serial Number** – the unique identification number assigned to each unit (with model-specific prefix). ***Note:*** *Enter your inverter's serial number in the table at the bottom of page i.*
5. **Display Panel** – a removable remote display that shows the inverter's measured battery voltage, total AC output power, and any error or warning codes. The display has LEDs that provide the inverter's status, and includes SELECT and POWER buttons that are used to adjust the inverter's settings and to turn the inverter on/off (See Section 3.3).
6. **AC Output Circuit Breaker** – this supplementary 20-amp circuit breaker protects the unit's GFCI outlet. The circuit breaker pops out when it opens—press in to reset.
7. **DC Ground Connection** – the connection that is used to tie the exposed chassis of the inverter to the DC grounding system. The DC grounding system could be the vehicle's chassis, the DC grounding bus, or the engine's negative bus. To attach ground wires, use a pressure or mechanical connector (i.e., ring terminal) with a 1/4" opening.

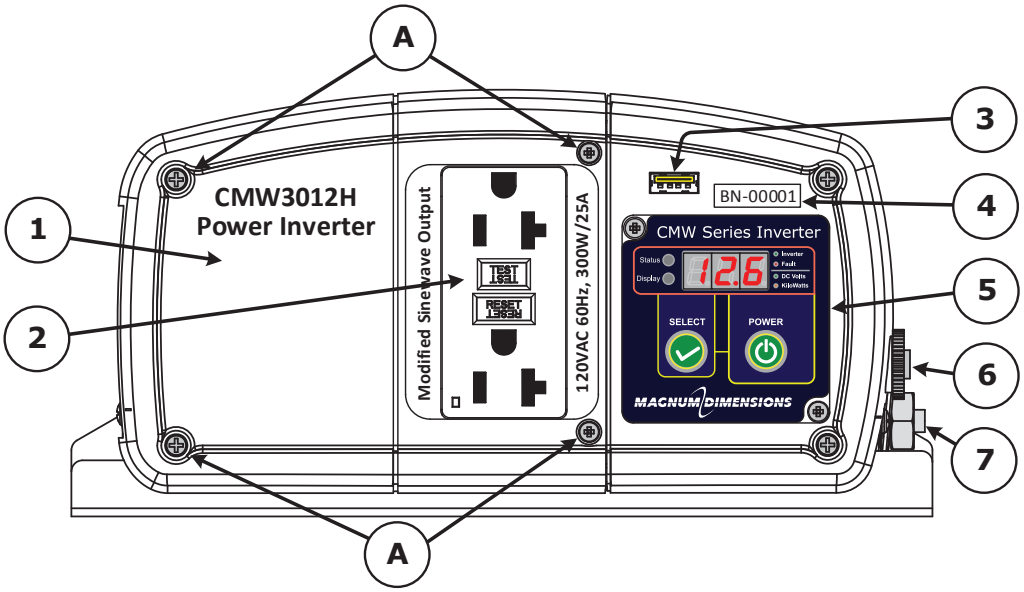


Figure 1-1, Front Panel Features

The following front panel features are available on the CMW3012H inverter once the access cover is removed (See Figure 1-2):

Info: To access and view the AC terminal block, remove the four Phillips screws (Figure 1-1, Items A) that secure the AC wiring access cover.

8. **AC Exit Openings** – two 1/2" knockouts are provided to accommodate the inverter's AC output wiring.
9. **AC Output Terminal** – this three-pole terminal block is used to connect the inverter's AC output wiring. This terminal block allows a dedicated panel (sub-panel) to be connected between the inverter's output wiring and the AC loads. Refer to Section 2.5.3 for detailed information on wiring the AC output terminal.

   Note: *The AC output terminals (L/N) are protected by the inverter's 20-amp AC output circuit breaker (Figure 1-1, Item 6), which limits the pass-thru current to 20 amps.*

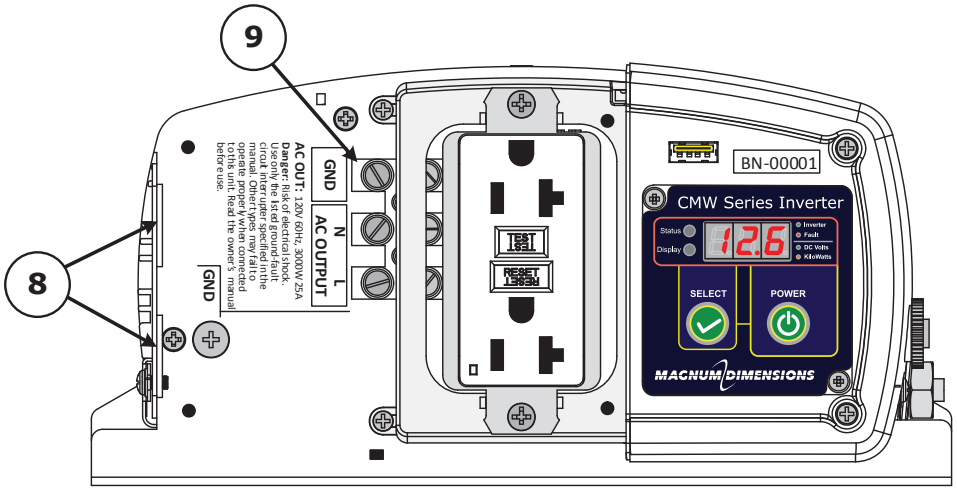


Figure 1-2, Front Panel Features (Cover Removed)

The back panel of the CMW3012H inverter is equipped with the following features (See Figure 1-3):

10. **Model Number** – the model number of the inverter.
11. **DC Negative Terminal (black)** – the inverter's connection to the negative terminal on the 12 VDC battery bank.
12. **Cooling Fan(s)** – intake cooling fans that automatically turn on when the inverter's internal temperature rises above 122°F (50°C)—fans turn off when the inverter's internal temperature falls below 122°F (50°C).
13. **DC Positive Terminal (red)** – the inverter's connection to the positive terminal on the 12 VDC battery bank.
14. **Mounting Flanges (front and rear)** – used to mount and secure the inverter to a shelf/wall.

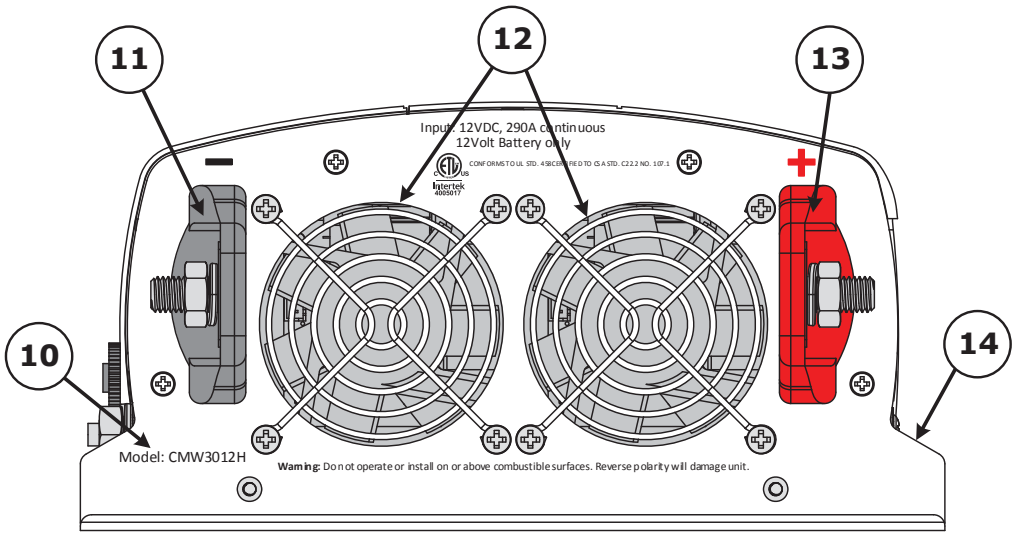


Figure 1-3, Back Panel Features

2.0 Installation

Review this section and all safety instructions before proceeding with the installation of your inverter.

WARNING: Installations should be performed by qualified personnel, such as a licensed or certified electrician. The installer determines which safety codes apply and ensures all applicable installation requirements are followed. Applicable installation codes vary depending on the specific location and application.

WARNING: Before installing, review the "Important Product Safety Information" on page ii and adhere to all cautionary markings located on the inverter and on the batteries.

2.1 Pre-Installation

Before proceeding, read the entire Installation section to determine how best to install your CMW3012H inverter. The more thorough you plan in the beginning, the better your inverter needs will be met. There are two simplified system diagrams shown in Figures 2-1 and 2-2. These diagrams should be reviewed to assist you in planning and designing your installation. These drawings are not intended to override or to restrict any national or local electrical codes, and should not be the determining factor as to whether the installation is compliant, that is the responsibility of the electrician and the on-site inspector.

2.1.1 Installation Guidelines

- Before connecting any wires, determine the cable routes throughout the vehicle or boat, both to and from the inverter.
- Always check for existing electrical, plumbing, or other areas of potential damage BEFORE drilling or cutting into walls.
- Make sure all wires have a smooth bend radius and do not become kinked.
- If installing this inverter in a boat, RV or truck, ensure the conductors passing through walls, bulkheads, or other structural members are protected. This minimizes insulation damage (such as chafing), which can be caused by vibration or constant rubbing.

2.1.2 Unpacking and Inspection

Carefully remove the inverter from its shipping container and inspect all contents. Verify the following items are included:

- CMW3012H inverter
- CMW3012H Owner's Manual

If items appear to be missing or damaged, contact your authorized Magnum-Dimensions dealer or Magnum-Dimensions directly.

****** Save your proof-of-purchase as a record of your ownership; it is needed if the unit should require in-warranty service. ******

2.1.3 Tools Required

Installing the inverter is simple and requires the following:

- Adjustable wrench (10-13 mm)
- #10 Mounting screws (x4)
- Phillips & flat-head screwdrivers
- Level
- Pencil
- Drill
- Drill bits

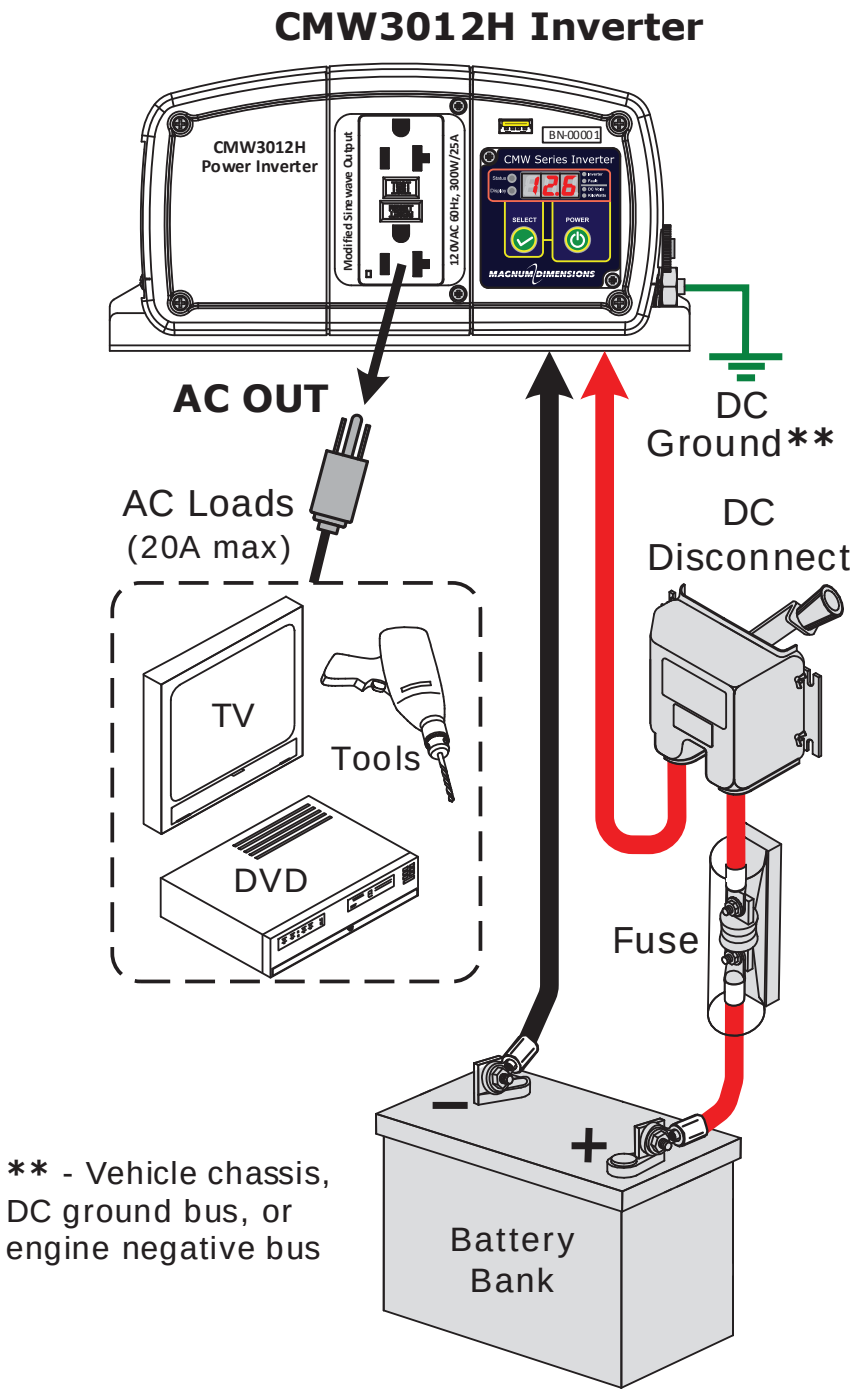
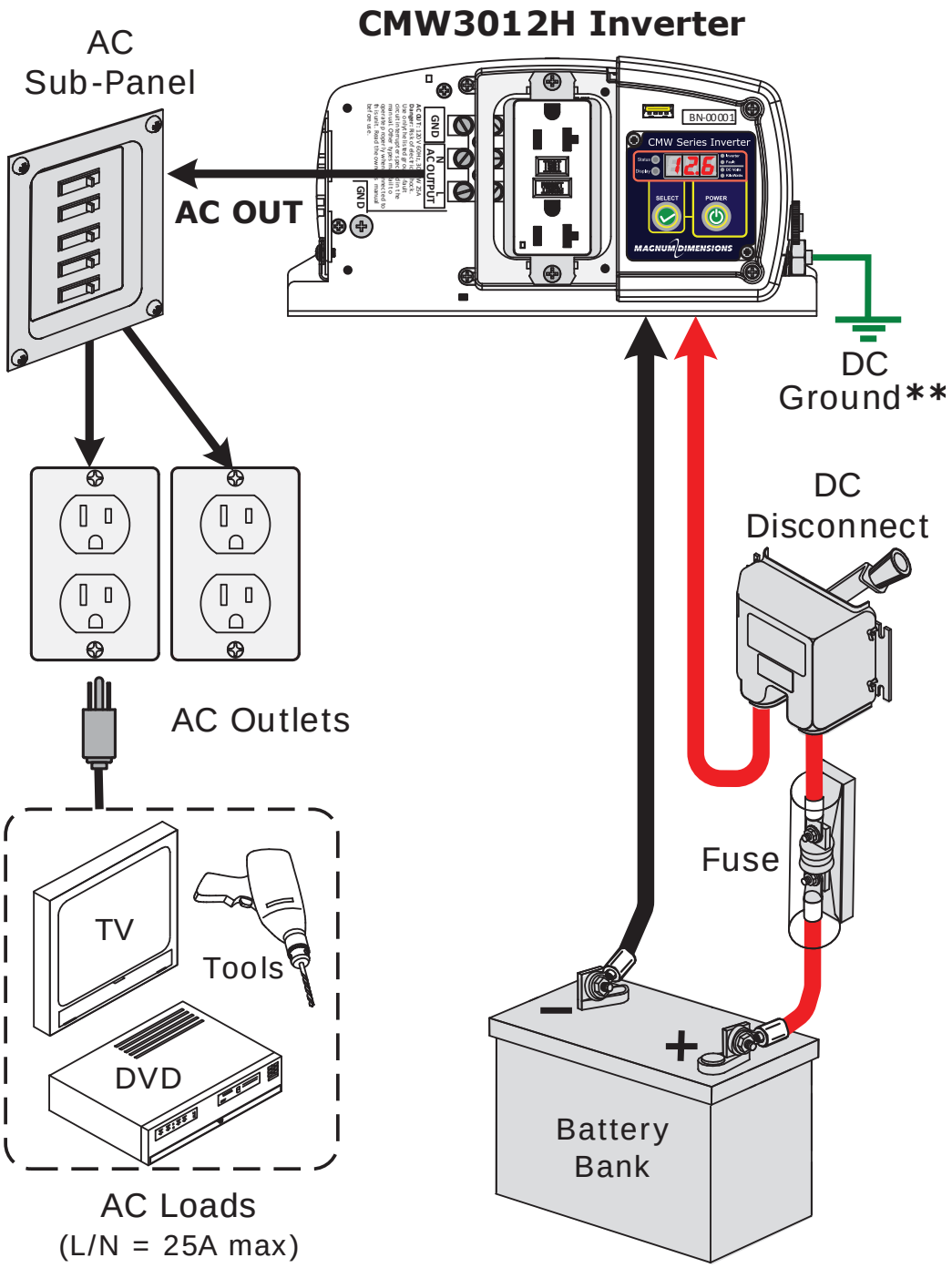


Figure 2-1, Simplified Diagram (GFCI)



** - Vehicle chassis, DC ground bus, or engine negative bus

Figure 2-2, Simplified Diagram (Hardwired)

2.2 Locating and Mounting the Inverter

WARNINGS:

- Do not mount the inverter near any flammable or combustible fluid or components.
- Provide adequate clearance/ventilation to the inverter. Do not cover or obstruct any air vent openings and/or install in a zero-clearance compartment.

The CMW3012H inverter should only be installed and mounted in a location that meets the following requirements:

Clean and dry – The inverter should not be installed in an area that allows dust, fumes, insects, or rodents to enter or block the inverter's ventilation openings. This area also must be free from any risk of condensation, water, or any other liquid that can enter or fall on the inverter. Inverter failure under these conditions is not covered under warranty.

Cool – The inverter should be protected from direct exposure to the sun or to any equipment that produces extreme heat. The ambient temperature should be between 32°F (0°C) and 104°F (40°C); note that the inverter's output specifications are rated at 77°F (25°C), so the cooler the better.

Ventilated – In order for the inverter to provide full output power and avoid over-temperature fault conditions, do not cover or block the inverter's ventilation openings, or install this inverter in an area with limited airflow. Allow a minimum airspace clearance of 3" (7.6 cm) around the unit to provide optimum ventilation.

Safe – Keep any flammable/combustible material (e.g., paper, cloth, plastic, etc.,) that may be ignited by heat, sparks, or flames at a minimum distance of 2 feet (60 cm) away from the inverter. Do not install in any area that contains extremely flammable liquids like gasoline or propane, or in locations that require ignition-protected devices.

Close to the battery bank – As with any inverter, it should be located as close to the batteries as possible. Long DC wires tend to lose efficiency and reduce the overall performance of an inverter. However, the unit should not be installed in the same compartment as the batteries or mounted where it will be exposed to gasses produced by the batteries. These gasses are corrosive and will damage the inverter; also, if these gasses are not ventilated and if allowed to collect, they could ignite and cause an explosion.

Accessible – Do not block access to the front or back of the inverter. Allow room to view any indicators or the digital display and to access the AC and DC wiring connections—these wiring connections will need to be checked and tightened periodically.

Orientating the inverter – When mounted indoors, the CMW3012H inverter can be mounted on/underneath a horizontal surface (shelf or table) or on a vertical surface (wall or bulkhead) with the DC terminals facing left, right, or up; do not mount with the DC terminals facing downward (see Figure 2-3).

After determining your mounting position, use the base of the inverter's chassis as a template to mark your mounting screw locations (or, refer to the dimensions in Figure 2-4). Remove the inverter and drill pilot holes into the mounting surface. Secure the inverter to the surface using the appropriate corrosion-resistant hardware. If this unit is used in a mobile application, you may want to place flexible washers or bushings between the mounting surface and the inverter's mounting flanges to reduce vibration.

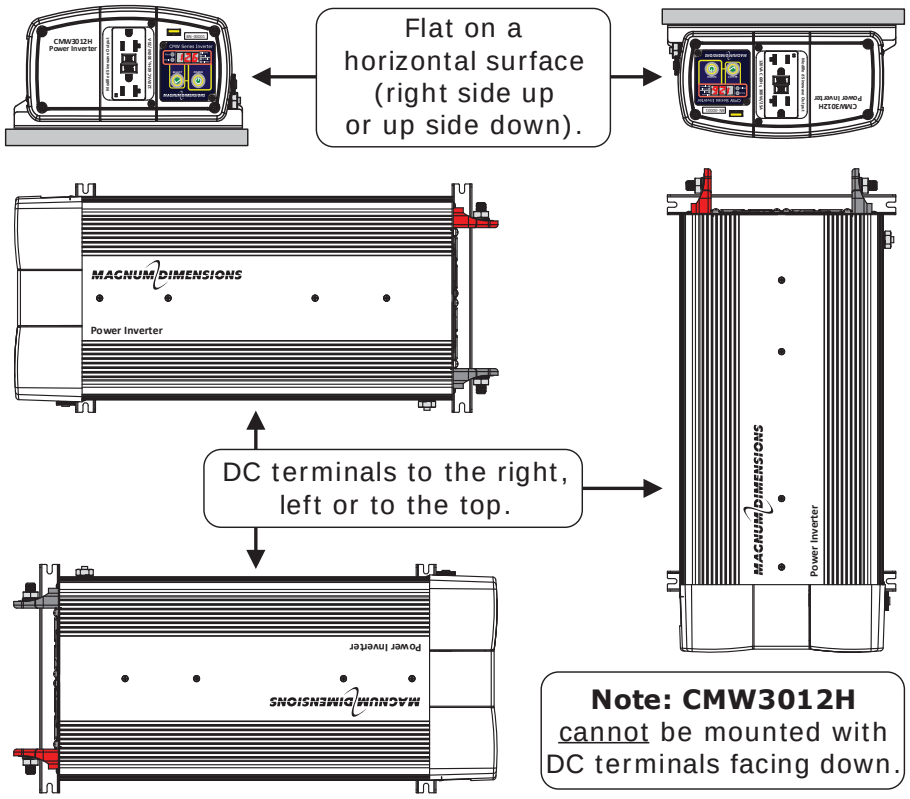


Figure 2-3, Approved Mounting Positions

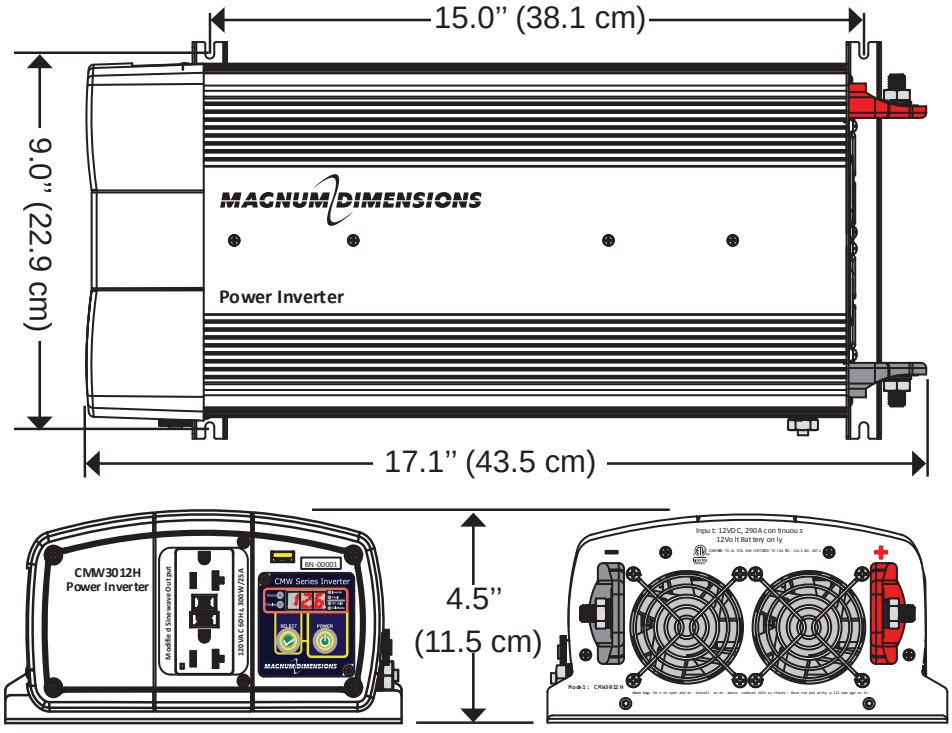


Figure 2-4, CMW3012H Dimensions

2.3 Wiring the Inverter – General Requirements

This section describes the requirements and recommendations for wiring the CMW3012H inverter. Read all instructions before wiring the inverter.

The NEC (National Electric Code, ANSI/NFPA 70) for the United States and the CEC (Canadian Electrical Code) for Canada provide the standards for safely wiring residential and commercial installations. The NEC/CEC lists the standards for wire sizes, overcurrent protection, and installation methods and requirements.

Inverter systems involve power from multiple sources (inverter and batteries) which can make the wiring more hazardous and challenging.

WARNING: Ensure all sources of DC power (i.e., batteries) are de-energized (i.e., breakers opened, fuses removed) before proceeding—to prevent accidental shock.

WARNING: Wiring should meet all local codes/standards and be performed by qualified personnel (i.e., licensed electrician).

2.3.1 Wiring Requirements

- All conductors that are at risk for physical damage must be protected by tape or placed in a raceway.
- Always check for existing electrical, plumbing, or other areas of potential damage prior to making cuts in structural surfaces or walls.
- Use only copper wires with a minimum temperature rating of 75°C (194°F).
- Do not mix AC and DC wiring in the same conduit or panel unless specifically approved/designed for both AC and DC wiring. Where DC wiring must cross AC or vice-versa, try to make the wires at the crossing point perpendicular (90 degrees) to one another.
- DC overcurrent protection (and AC, if hardwired) must be provided as part of the installation.
- The inverter requires a reliable negative and ground return path directly to the battery.

2.3.2 Torque Requirements

All wiring to the AC and DC terminals should be checked periodically (once a month) for proper tightness. For the torque requirements, refer to Table 2-1. If you don't have a torque wrench, ensure all connections are tight.

Table 2-1, Torque Requirements

Terminal	Size	Torque Requirements	Tool Size Needed
AC Terminals (AC output)	M3.5 × 7 screws	5 to 8 lbf-in (.6 to .9 N-m)	flat-head screwdriver (2.9 to 3.5 mm blade)
DC Terminals	M8 x 1.25 Hex nuts	16 to 21 lbf-ft (21.7 to 28.5 N-m)	13 mm wrench
DC Ground	M6 x 1.0 Hex nut	79 to 96 lbf-in (8.9 to 10.9 N-m)	10 mm wrench

2.4 DC Wiring

This section describes the inverter's required DC wire sizes, the recommended disconnect/overcurrent protection, and how to make the DC connections to the inverter and the battery bank.

WARNING: Even though DC voltage can be regarded as "low voltage", significant hazards may be present, particularly from short circuits of the battery system.

CAUTION: The inverter is NOT reverse polarity protected—if the negative and positive battery voltage are connected to the inverter backwards, the inverter will likely be damaged. Use a voltmeter to verify the correct polarity BEFORE connecting the DC wires.

CAUTION: DO NOT connect the battery cables to the inverter until all wiring is complete and the correct DC voltage and polarity have been verified.

Refer to Figure 2-5 when connecting the DC wires to the battery, and to Figure 2-6 when connecting to the inverter. Also, consider the following requirements to ensure maximum performance:

- The DC positive and negative cables connected to the inverter from the battery bank should be tied together with wire ties/straps or electrical tape approximately every 6 inches (15.3 cm). This helps improve the surge capability and reduces the effects of inductance, which improves the inverter waveform and reduces the wear of the inverter's filter capacitors. Keeping the battery cables close together also reduces the chance of radio frequency interference.
- Be aware that over-tightening or mis-threading the nuts on the DC terminals can cause the bolts to strip and snap/break off.
- Make sure cables have a smooth bend radius and do not become kinked. Follow existing wire runs where possible.
- Use crimped and sealed copper ring terminal lugs with at least a 6 mm (1/4") bolt hole to connect the DC wires to the inverter's DC terminals.
- The battery bank voltage MUST be between 10.5-15.5 for the inverter to operate. If the voltage exceeds 16.0V, the inverter may be damaged.
- To ensure the maximum performance from the inverter, all connections from the battery bank to the inverter should be minimized. The exceptions are the DC fuse and disconnect, or the DC circuit breaker—required at the battery to protect the DC wiring—in the positive line. Any other additional connection will contribute to additional voltage drops, and these extra connection points may loosen during use.
- A brief spark or arc may occur when connecting the battery cables to the inverter DC terminals; this is normal and due to the inverter's internal capacitors being charged.
- Before routing the wiring, color code the DC cables/wires with colored tape or heat shrink tubing: RED for positive (+); WHITE for negative (–); and GREEN (or bare copper) for DC ground, to avoid polarity problems.
- In a truck/RV installation, connect a cable directly from the inverter's negative terminal to the battery negative connection to ensure the inverter has a reliable return path directly to the battery. Do not use the vehicle chassis in place of the battery negative connection.
- Where DC wiring must cross AC or vice-versa, try to make the wires at the crossing point perpendicular (90 degrees) to one another.

2.4.1 DC Wire Sizing

It is important to use the correct sized DC wire to achieve maximum efficiency from the system and to reduce fire hazards associated with overheating. Always keep your wire runs as short as practical to prevent low voltage shutdowns and to keep the DC breaker from nuisance tripping (or open fuses) because of increased current draw. See Table 2-2 to select the minimum DC wire size (and corresponding overcurrent device) required based on your inverter model. The cable sizes listed in this table are required in order to reduce stress on the inverter, minimize voltage drops, increase system efficiency, and ensure the inverter's ability to surge heavy loads.

If the distance from the inverter to the battery is >5 feet (1.5 m), the DC wire needs to be increased. Longer cable distances affect inverter performance. See the bottom of Table 2-2 to determine the minimum DC wire size needed for various distances greater than 5 feet—based on your inverter model.

DC Wire Size Exception: In an OEM RV application, smaller DC wire (with appropriate overcurrent protection) may be used if the inverter will only be connected to a dedicated load, and the inverter and dedicated load have been thoroughly tested and sold together by the OEM as a complete system.

Table 2-2, DC Wire / Overcurrent Device for Rated Use

		CMW3012H
Full Load Current		190 amps
Maximum Continuous Current[1]		229 amps
Minimum DC Ground Wire Size[2]		#8 AWG (8.36 mm^2)
Minimum DC Wire Size [90°C rating in free air]		#2/0 AWG (67.4 mm^2) [300 amps]
Maximum DC Fuse Size		300 amps with time delay
Increased size for longer distance	**5 to 10 feet =**	#4/0 AWG (107 mm^2)
	10 to 15 feet =	Not recommended

Note[1] *– Maximum Continuous Current is based on the inverter's continuous power rating at the lowest input voltage with an inefficiency factor.*

Note[2] *– The grounding conductor for the DC system shall meet the sizing requirements specified in the NEC for the application, but must be no smaller than #8 AWG copper. In some applications (i.e., marine installations), the DC grounding conductor is required to be no less than one size smaller than the wire size of the DC positive/negative cables.*

2.4.2 DC Overcurrent Protection

For safety reasons and to comply with electrical code regulations, DC overcurrent protection must be provided as part of the installation. The DC overcurrent protection device must be installed in the positive DC cable line. The NEC requires both overcurrent protection and a disconnect switch, it can be a fuse (with a disconnect switch) or a circuit breaker and must be DC-rated. It must be correctly sized according to the size of DC cables being used, which means it is required to open before the cable reaches its maximum current carrying capability, thereby preventing a fire.

Because batteries can deliver thousands of amps in an instant during a short, a DC-rated fuse (or circuit breaker) that has an AIC (Amps Interrupting Current) rating that can withstand the short-circuit current without explosion or damage is required to be installed. If a fuse is used as an overcurrent device, a Class-T type or equivalent is highly recommended when used with inverters. A Class-T fuse is rated for DC operation, can handle very high short-circuit currents (up to 100,000 AIC), and has a time delay that allows for momentary current surges from the inverter without opening the fuse. In some installations, if the combined short-circuit current of all the batteries in the bank is determined to be 2,700 amps or less, then an ANL type of fuse may be used—if in doubt, use a Class-T fuse. See Table 2-2 for the recommended fuse size (coordinated with the DC wire size).

2.4.3 DC Grounding

The inverter should always be connected to a permanent, grounded wiring system. The idea is to connect the metallic chassis of the various enclosures together to have them at the same voltage potential, to reduce the possibility for electric shock. For most installations, the inverter chassis and the negative battery conductor are connected to the system's ground bond via a safety grounding conductor (bare wire or green insulated wire) at only one point in the system. The grounding conductor for the DC system shall meet the sizing requirements specified in the NEC for the application, but must be no smaller than #8 AWG copper. For instance, an inverter used in a marine application under ABYC guidelines requires the size of the DC grounding conductor to be of an ampacity equal to or one size less than that of the DC positive conductor. See Table 2-2 for the minimum ground wire size recommended for your inverter.

Info: If the inverter is installed in a vehicle, connect the battery negative cable directly to the inverter's negative terminal. DO NOT connect the negative battery cable meant for the inverter to the vehicle's frame/safety ground.

2.4.4 DC Cable Connections

Do not put anything between the battery cable ring lug and the battery post (Figure 2-5), or the flat metal part of the inverter's DC terminal (Figure 2-6). When connecting the battery cable, it should be placed directly against the battery post or inverter terminal. Incorrectly installed hardware causes a high resistance connection which could lead to poor inverter performance, and may melt the cable and terminal connections. See Table 2-1 for the torque requirements.

Info: The DC terminal and Hex nuts on the CMW3012H are made of stainless steel, which has a high likelihood of galling or thread seizing while being tightened—causing the bolts to strip or to snap/break off. To reduce this risk, use an anti-seize lubricant, tighten the fasteners slowly (at low rpms) without interruption, and apply only light pressure.

2.4.5 Wiring the Battery Bank

WARNING: Lethal currents will be present if the positive and negative cables attached to the battery bank touch each other. During the installation and wiring process, ensure the cable ends are insulated or covered to prevent touching/shorting the cables.

Info: DO NOT connect the DC wires from the battery bank to the inverter until 1) all DC wiring is complete, 2) the correct DC overcurrent protection has been installed, and 3) the correct DC voltage and polarity have been verified.

Depending upon the voltage of the batteries (6 or 12 VDC), the batteries must be wired in series, parallel, or series-parallel to provide the correct voltage (see Appendix A).

Place the batteries as close as practical to the inverter, preferably in an insulated and ventilated enclosure. Allow adequate space above the batteries to access the terminals and vent caps (as applicable). Also, allow at least 1" (2.5 cm) of space between the batteries to provide good air flow.

CAUTION: Install batteries in a well ventilated area. Batteries can produce corrosive and explosive gasses. For compartment or enclosure installations, always vent batteries to the outside. DO NOT mount the batteries directly under the inverter.

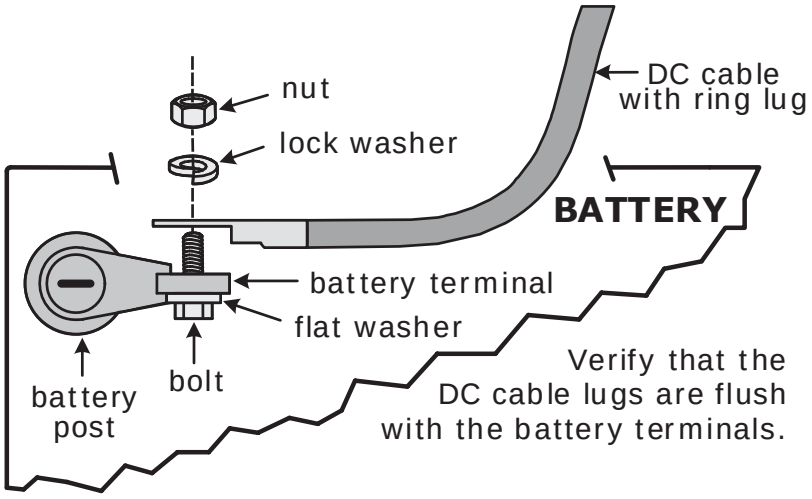


Figure 2-5, DC Cable to Battery Terminals

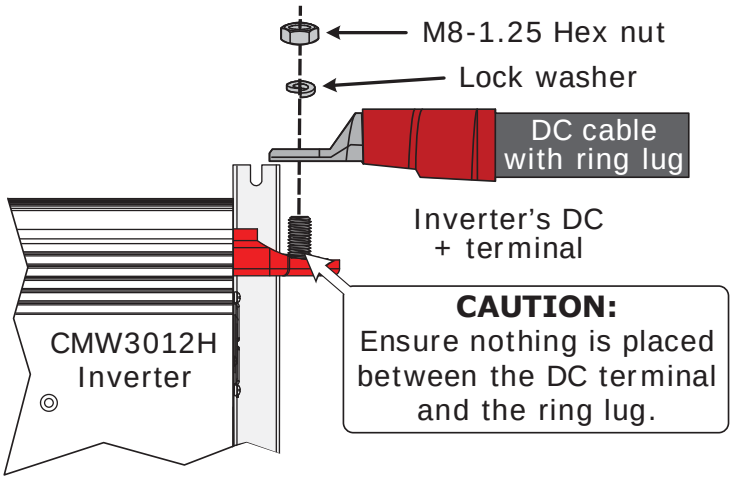


Figure 2-6, DC Cable to Inverter's DC Terminals

2.4.6 Wiring the Inverter to the Battery Bank

CAUTION: The inverter is NOT reverse polarity protected—if the positive terminal of the battery is connected to the negative terminal of the inverter and vice versa, severe damage to the inverter will occur and this will void the warranty. Before connecting the DC wires from the batteries to the inverter, verify the correct battery voltage and polarity using a voltmeter. If necessary, color code the cables (with colored tape): RED for positive (+), and WHITE for negative (–) to avoid polarity confusion.

Info: The DC overcurrent device (i.e., circuit breaker or fuse) must be placed in the positive (red) DC cable line between the inverter's positive DC terminal and the battery's positive terminal (red)—as close to the battery as possible. For maximum protection, install it within 18 inches (45 cm) of the battery.

Note: *The following directions are based on the use of a circuit breaker—refer to Figure 2-1 if you are using a fuse and a disconnect device instead.*

Use the steps below to wire the inverter to the battery bank:

1. Route an appropriately sized DC negative cable (marked white) from the negative terminal of the battery bank to the inverter's negative terminal (Figure 1-3; Item 11).
2. Mount the circuit breaker as near as practical to the batteries and leave open (i.e., no power to inverter).

   WARNING: DO NOT close the DC circuit breaker or connect the fuse to connect battery power to the inverter at this time. This will occur after the installation is complete.

   CAUTION: If connecting live battery cables to the inverter DC terminals, a brief spark or arc may occur; this is normal and due to the inverter's internal capacitors being charged.

3. Route and connect an appropriately sized DC positive wire (marked red) from the inverter's positive DC terminal (Figure 1-3; Item 13) to one end of the DC circuit breaker.
4. Connect a short wire (same rating as the DC wires) to the other end of the DC circuit breaker, and then route and connect that wire to the positive terminal of the battery bank. This is essential to ensure even discharging across the entire battery bank.
5. Ensure the DC wire connections (to the batteries, inverter, and DC circuit breaker) are flush on the surface of the DC terminals, and all hardware used to hold these connections are stacked correctly (per Figures 2-5 and 2-6). Verify all DC connections on the inverter are torqued correctly (Table 2-1), and the total cable distance from the inverter to the battery is within the requirement of Section 2.4.1.
6. Once the DC connections are completely wired and tested, coat the terminals with an approved anti-oxidizing spray.
7. If batteries are in an enclosure, perform a final check of the connections to the battery terminals, then close and secure the battery enclosure.
8. Route an appropriately sized DC ground wire (see Table 2-2) from the inverter's DC chassis ground connection to a dedicated system ground.
9. Once the installation is complete and all connections verified, close the fuse disconnect (or circuit breaker) to provide power to the inverter.

2.5 AC Wiring

This section provides information on how to hardwire AC output connections to the inverter using the correct AC wire size and overcurrent protection.

2.5.1 Pre-AC Wiring Requirements

WARNING: DO NOT connect the inverter's output to an AC power source. This could cause severe damage to the inverter and is not covered under warranty.

CAUTION: Before installing any AC wiring, review all safety information in this manual to ensure a safe and long-lasting system.

- Always use properly rated circuit breakers.
- AC wiring must be copper wire and be approved for the application (i.e., residential, RV, or marine wiring).
- The wire sizes recommended in this manual are based on the ampacities given in Table 310.16 (in conduit) or Table 310.17 (in free air) of the National Electrical Code, ANSI/NFPA 70, for 75ºC (167ºF) copper wire based on an ambient temperature of 30ºC (86ºF).

2.5.2 AC Wire Size and Overcurrent Protection

If you opt to hardwire the AC output to the CMW3012H's terminal block (Figure 1-2, Item 9), the wiring must be sized per any local electrical safety code requirements to ensure the wire's ability to safely handle the inverter's maximum load current. The AC wiring must be protected from short circuits and overloads by an overcurrent protection device and have a means to disconnect the AC circuits. AC overcurrent protection is not included in the inverter and must be provided as part of the inverter's installation. The AC overcurrent protection device must be either a circuit breaker or a fuse/disconnect, and be properly sized and branch circuit rated for the wire it is protecting and the appliances being powered.

2.5.3 AC Terminal Block Connections

If you need to supply more than 20A of current to the AC loads or if GFCI protection is not required, then wire to the L/N/G output terminals (Figure 2-7).

The CMW3012H has a three-pole AC output terminal block to connect the inverter's output wiring. This terminal block (Figure 1-2, Item 9) allows a dedicated panel (sub-panel) between the inverter's output wiring and the AC loads. To access and view the AC terminal block, remove the four Phillips screws (Figure 1-1, Items A) holding the AC wiring access cover.

Each connection on the AC terminal block is rated to accept one #14 to #10 AWG (2.1 to 5.3 mm^2) CU stranded wire. They each use a M3.5 slotted head screw, and the maximum tightening torque is 5 to 8 lbf-in (0.6 to 0.9 N-m).

Info: To comply with ABYC requirements for marine installations, the AC terminal blocks have a stainless steel wire protector to prevent wire damage from the set-screw.

2.5.4 Wiring the Inverter AC Output

WARNING: DO NOT connect the inverter's output to an AC power source. This could cause severe damage to the inverter and is not covered under warranty.

The AC output has two types of AC connections:

- Use the GFCI outlet to power AC loads – This configuration does not require AC output hardwiring. Plug the AC load into the GFCI outlet.
- Hardwire the L/N AC output terminals – This configuration connects the AC loads directly to the output side of the inverter (Figure 2-7). The AC output is limited to 25 amps (the rating of the inverter output).

2.5.5 Hardwiring the AC Output Wires

This section has basic guidelines for hardwiring the AC output from the CMW3012H inverter to a dedicated sub-panel.

WARNING: Before making any AC connections, make sure all power is removed from the inverter.

Before wiring:

- Remove the AC access cover (Figure 1-1, Item 1) by unscrewing the four screws located at the front of the AC compartment cover (Figure 1-1, Items A)—to access the AC terminal blocks.
- Remove one of the AC knockouts, and then place a strain relief clamp in that knockout's opening (Figure 1-2, Item 8).
- After all wires are routed through the AC knockout on the inverter, tighten the strain relief clamp securely on the wires—always leave a little extra slack in the wiring.

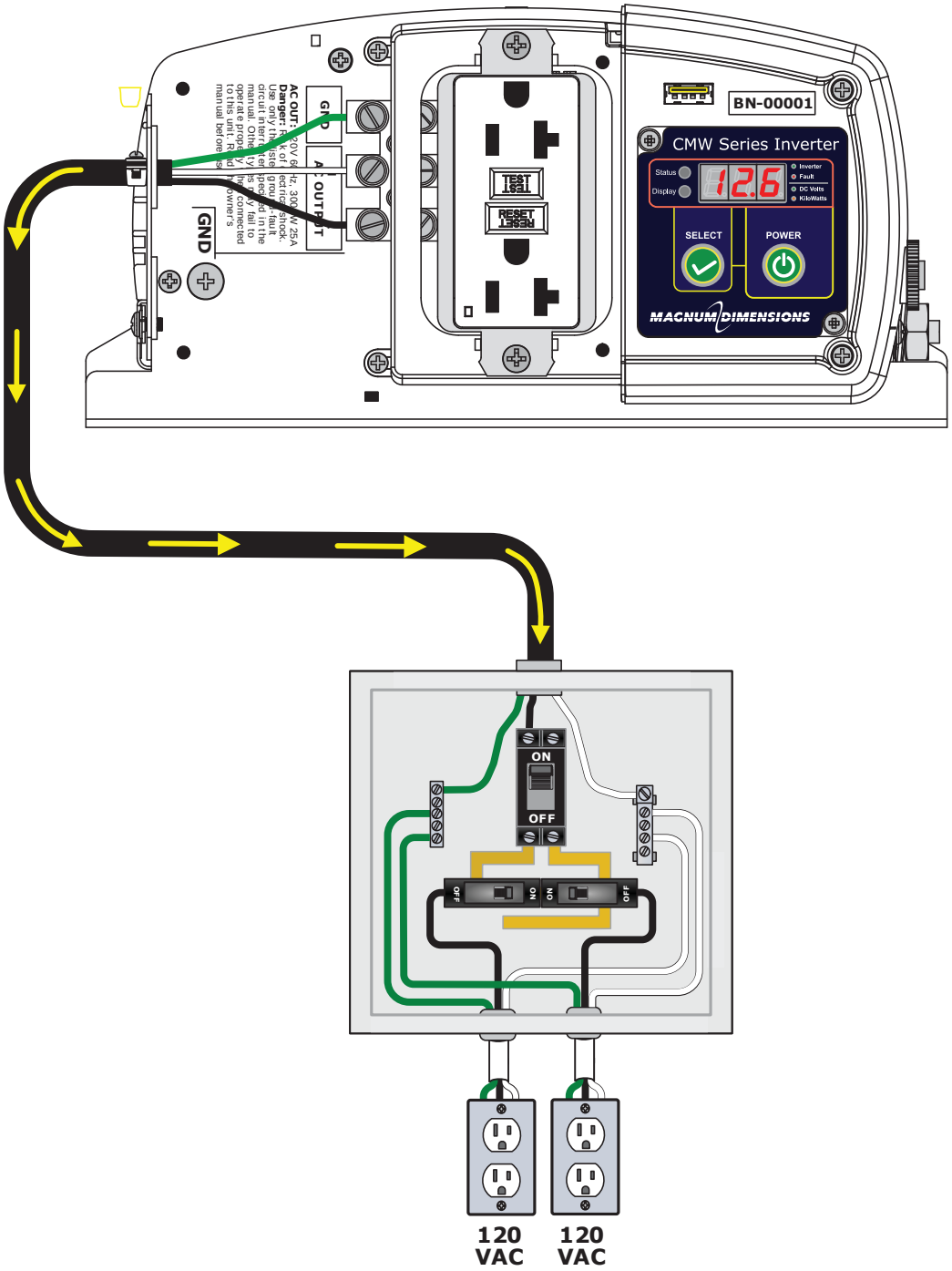
Hardwiring steps:

1. Route the AC output wires (hot, neutral, and ground) from the AC electrical sub-panel through the strain relief clamp on the inverter.
2. Connect a hot (BLACK) wire from the inverter's hot/line (L) output terminal to the sub-panel's main breaker.
3. Connect a neutral (WHITE) wire from the inverter's neutral (N) output terminal to the sub-panel's neutral busbar.
4. Connect a ground (GREEN) wire from the inverter's AC ground (GRD) terminal to the sub-panel's ground busbar.

AC Wiring Inspection

1. Verify all wire runs are secured. When installed in a mobile installation, use wire ties or other non-conductive fasteners to prevent chafing or damage from movement and vibration.
2. Verify strain reliefs or grommets are in place to prevent damage to the wiring or conduit where it passes through walls/bulkheads or other openings.
3. After verifying all AC connections are correct, ensure all inverter AC terminals are torqued correctly.
4. Replace the AC wiring access cover and the covers on the main electrical/ distribution panel.

CMW3012H
Series Inverter



25A maximum output

Sub-Panel and Outlets (Inverter Loads)

Figure 2-7, AC Wiring (25A)

2.5.6 Removing the Display Panel

The display panel on the inverter can be removed and installed in a different location with a user-supplied 6-pin/conductor standard telephony cable (also referred to as a RJ12 cable).

- Remove the two screws at the front of the display panel, and then disconnect the small RJ12 cable from the inverter and the display panel.
- Install the display panel in the desired location, and then connect one end of the longer remote cable to the inverter and the other end of that cable to the display panel.

Remote cable

The remote cable you supply must be a 6-conductor telephony type with 6P6C (6-position/6-conductor) connectors on each end, i.e., when the 6P6C connectors are held side by side with both of the connector tabs facing the same way the color of the conductors in each connector are the opposite from top to bottom (Figure 2-8).

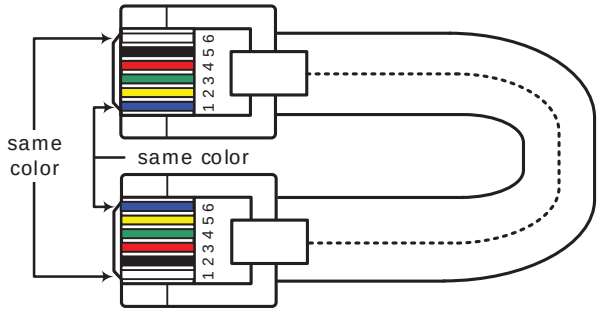


Figure 2-8, Remote Cable

2.6 Testing the Inverter

Before proceeding, you must first test whether the inverter was successfully installed. Use the functional test below to ensure the inverter is functioning properly.

2.6.1 Inverter Functional Test

After all electrical connections to the inverter, batteries, and loads (using a sub-panel) have been completed, follow these steps to test the installation and the inverter's operation.

1. Check the battery voltage and polarity before connecting the batteries to the inverter. Use a multimeter to verify 10.5 to 15.5 VDC at the batteries' positive and negative terminals.
2. Apply battery power to the inverter by switching the DC disconnect on (or close the DC circuit-breaker)—the inverter will remain off.
3. Prior to turning on the inverter, make sure all connected loads (e.g., appliances) are switched off or disconnected from the AC outlets.
4. Press and hold the POWER button until a beep is heard (about 1 second)—to turn the inverter on. Verify that the inverter's revision and version numbers (as well as the measured battery voltage) are shown on the display, and the Status light comes on (amber). This indicates the unit is in Inverter mode—running from battery power.

5. Check the output voltage of the inverter by connecting a multimeter to the outlets powered by the inverter. Verify the voltage is from 104 to 127 VAC.
6. Plug a small AC load (e.g., 40W light bulb) into the GFCI's outlet. Turn it on and verify it comes on. Continue to keep the load connected and turned on.

   Note: *If the bulb does not light, the GFCI may have tripped and needs to be reset.*
7. Press and hold the POWER button until a beep is heard (about 1 second)—to turn the inverter off. The inverter's status indicator and the connected load should go off.

If the inverter passes all the steps, it is ready for use. If it fails any of the steps, refer to the troubleshooting information in Section 4.0.

2.6.2 GFCI Outlet Test

The GFCI-protected AC outlet is used to plug in and power an AC load. It protects the user against hazardous electrical shocks. Use the steps below to periodically test the GFCI to ensure it is operating properly.

1. Turn the inverter on.
2. Plug a small AC load (e.g., 40W light bulb) into the GFCI's outlet.
3. Check that the AC load is on (i.e., the bulb lights).
4. Press the GFCI's TEST button. The GFCI's RESET button should pop out, and the power should shut off (light bulb goes out).

   Note: *If the bulb remains lit or the RESET button does not pop out, the GFCI may not be functioning properly*.
5. Press the RESET button. The AC load should come back on (bulb lights again).

3.0 Operation

The CMW3012H inverter has one normal mode of operation: Inverter mode.

3.1 Inverter Mode

In Inverter mode, the inverter supplies AC power to your appliances by inverting the DC power from the connected batteries.

When first connected to a battery, the inverter is off. To turn the inverter on, press and hold the POWER button until a beep sound is heard (~1 second).

- **OFF** – When the inverter is off, no power is used from the batteries to power the AC loads, and the Status LED will be off.
- **ON** – When the inverter is turned on it powers your loads using the batteries, and the Status LED will be on (green).
- **Inverting** – When the inverter is on, the CMW3012H uses DC power from the battery to supply 120 VAC power to your loads. The amount of time the unit inverts and provides power is directly related to the amount of connected AC loads, and the capacity of the battery bank.

3.2 Display Panel Operation

This section provides information on the display panel (Figure 1-1, Item 5).

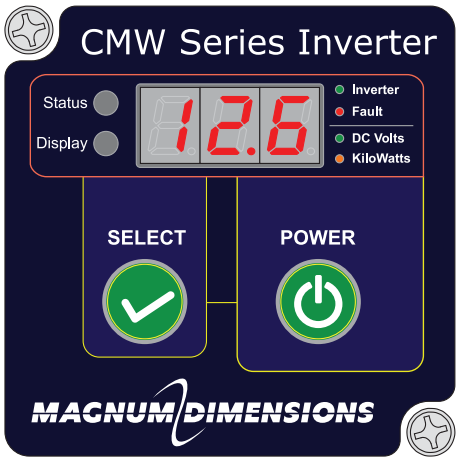


Figure 3-1, Display Panel

3.2.1 Status and Display LED Indicators

The Status and Display LEDs on the front display panel are used to indicate the inverter's status (see Table 3-1).

Table 3-1, Status and Display LED Functions / Statuses

Status LED	Display LED	Display	Function / Status
Green	Green	12.5	Inverter mode. Inverter running, displays battery voltage in VDC.
	Amber*	0.80	Inverter mode. Inverter is running and display shows output power in kW (e.g., 0.80KW=800W).
Red (solid)	OFF	E01-E07	The unit has shut down. Display shows an error code (Table 4-1).

***** – *When in Inverter mode and the digital display shows battery voltage, you must press the SELECT button (~1 sec) to show output power.*

3.2.2 POWER / SELECT Buttons and Digital Display

A beep sound occurs every time the POWER or SELECT button is pressed.

POWER button

Turns the inverter on/off, and is used to access available inverter settings.

SELECT button

Used to check/change the inverter's available settings.

Digital Display

Alternately shows battery voltage and total AC output power. This display also shows error codes (Table 4-1) if a fault should occur, and inverter settings when in menu mode (Table 3-2).

LED Key (to the right of the digital display)

Used as a quick reference to the inverter's status when viewing the Status and Display LEDs. The Status LED can be green (*Inverter* operating normally) or red (*Fault* condition present). The Display LED can be green (digital display showing battery voltage – *DC Volts*) or amber (digital display shows output power – *KiloWatts*).

3.3 Adjusting the Inverter's Settings (Menu mode)

You can use the POWER and SELECT buttons to change the inverter's settings (refer to Figure 3-2 as a guide). Table 3-2 provides information on the different settings available for the CMW3012H inverter.

Table 3-2, Inverter Settings

Battery Under Voltage Settings	
SdL	Battery under-voltage setting is set to LOW (normal operation). Under-voltage alarm: 11.0 VDC Under-voltage alarm recovery: 11.3 VDC Under-voltage shutdown: 10.5 VDC Under-voltage recovery: 12.0 VDC
SdH	Battery under-voltage setting is set to HIGH (setting to avoid battery over-discharge when connected to a car start battery). Under-voltage alarm: 12.1 VDC Under-voltage alarm recovery: 12.3 VDC Under-voltage shutdown: 11.8 VDC Under-voltage recovery: 12.6 VDC
Alarm Settings	
AL0	Fault and warning audible alarm is disabled. Display panel only shows error code, and the audible alarm will not sound.
AL1	Audible alarm will sound when a fault or warning occurs.
Factory Default Setting	
Fd	Resets all settings to factory default settings (SdL, AL1).

To change an inverter setting:

1. Press and hold the POWER and SELECT buttons together until a beep is heard (~5 seconds). You are now in menu mode.
2. Press the POWER button for 1 second to toggle between the different menus: **AL** (Alarm), **Sd** (Low Volts Shutdown), and **Fd** (Factory Default).
3. Press the SELECT button for 1 second to enter the selected menu—to make changes to the current setting.
   - Press the SELECT button for 1 second to toggle between different setting values within this menu.
   - Press and hold the SELECT button for 5 seconds to set the selected setting—and then exit to the next menu item.

   Note: *The unit will EXIT the menu mode automatically if the POWER or SELECT buttons are not pressed within a 5-second time frame.*

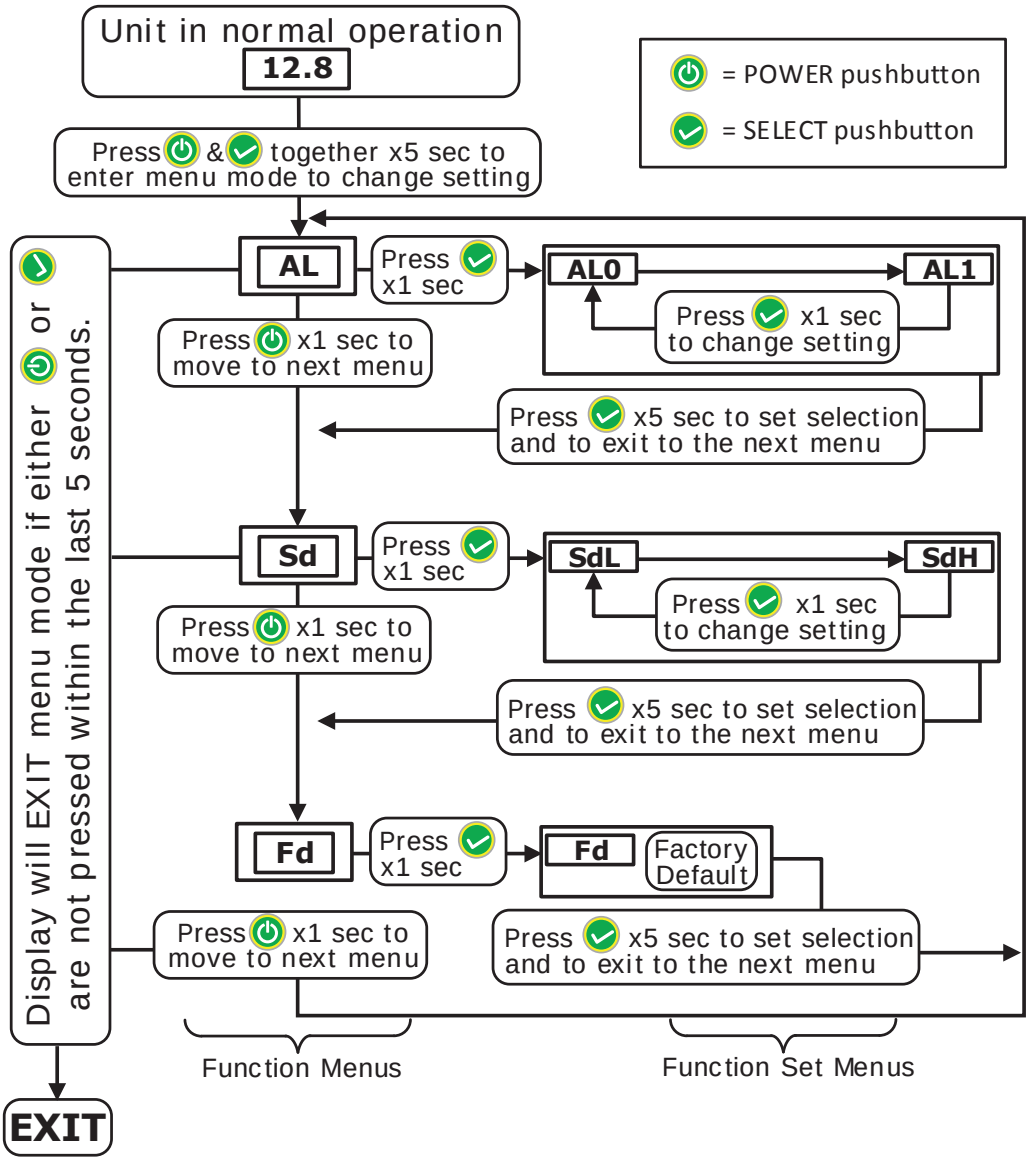


Figure 3-2, Inverter Setting Flow Chart

3.4 Loads, Power Consumption and Run Time

3.4.1 Understanding Loads

The inverter can power most loads within its power rating, however, there are special conditions that can cause a load to behave differently than expected.

Motor loads not starting – Some appliances, particularly those with induction motors, require a much higher start-up surge than they do when running [e.g., pumps, freezers and refrigerators (compressors)]. The inverter may not be able to start some of these even though their rated current draw is within the inverter's limits. If a motor-operated appliance refuses to start, observe the digital display's DC Volts LED indicator while trying to start the appliance. If the display shows a battery drop below 11 volts while the inverter is trying to start the motor, this may explain why the appliance will not run. Make sure the length and diameter of the battery cables are appropriate. Ensure the battery connections are good and that the battery is fully charged. If the cables are sized correctly, the connections are good, and the battery is charged, you may need a larger battery bank.

Loads turning off and on – If a load starts but quickly turns off, then the battery may not be able to deliver the necessary amperage to drive the load. If the battery bank cannot deliver the necessary amperage to drive a heavy load, the inverter shuts OFF due to low voltage (<10.5 VDC). The battery voltage can then slowly rise back above the low voltage reconnect voltage (11.8 VDC) causing the inverter to resume operation. As soon as the heavy load draws the batteries down, this cycle will continue unless the load is reduced or more batteries are added.

Loads too large – Although the CMW3012H inverter can provide high surge power up to two times the rated output power, some appliances may still trigger the inverter shutdown/protection system.

Running several loads at once – Sometimes the total surge requirement of all the loads is higher than the CMW3012H inverter can deliver. You may want to turn them on individually to ensure that the inverter does not have to deliver the starting current for all the loads at once.

3.4.2 Appliance Power Consumption and Run Time

The CMW3012H can power a wide range of household appliances including small motors, hair dryers, clocks and other electrical devices. As with any appliance using battery power, there is a certain length of time that it can run—this is "run time". Table 3-3 provides estimates of power consumption and run time for various appliances using a 12V-120AH battery bank.

Table 3-3, Appliance Power Consumption and Run Time

Load	Consumption	Estimated Run Time
Clock/Radio	8W	135 hrs
Table Lamp	40W/60W	27 hrs/18 hrs
Freezer (8.8 cu ft)	80W	15 hrs
20" LCD TV	100W	11.5 hrs
Refrigerator (18 cu ft)	120W	9 hrs
Sump Pump (1/2 hp)	350W	3 hrs
Microwave (mid-size)	1000W	49 min
Coffee Maker	1200W	37 min

4.0 Troubleshooting

When the inverter shows an error code, use Table 4-1 to determine what condition triggered the error/warning code and what corrective action is needed. Use Table 4-2 to troubleshoot your inverter based on the symptoms.

Table 4-1, Inverter Error Codes

Code	Condition	Corrective Action
E01	Input battery voltage is too low (<10.5 VDC)—the unit has shut down.	Immediately recharge the battery, and then restart the unit. Make sure the battery is connected to the unit.
E02	Input battery voltage is too high—the unit has shut down.	Check battery voltage, or determine if any external charger is connected to the battery bank.
E03	AC output has sensed an overload or short circuit—the unit has shut down.	Check the load connected to the output. Reduce the load and then restart the unit.
E04	Internal temperature is too high—the unit has shut down.	Turn the unit off, and then wait 15 minutes before restarting. Ensure the unit's air flow and fans are not blocked, and the unit's fans are running.
E05	Input battery voltage is low and has initiated a warning alarm (@11.2 VDC).	Recharge the battery—the unit will shut down shortly.
E06	Inverter mode. The connected AC output load is large and is close to the shutdown limit.	Reduce the load.
E07	Internal temperature is high and is close to the thermal shutdown limit.	Reduce the load and check if the unit's ventilation is blocked.

Table 4-2, Troubleshooting

Problem	Possible Cause / Condition	Solution
No AC output. All LEDs and the display are off.	The unit is off. ***Note:*** *The POWER button's on/off action takes place at its release moment and after a "beep" is heard.*	Turn the unit on by pressing the POWER button.
	No power coming into the unit.	Check the battery DC circuit breaker (fuse and disconnect switch, if installed).

Table 4-2, Troubleshooting (Cont.)

Problem	Possible Cause / Condition	Solution
No AC output. Status LED is red.	Unit has shut down. Circuit breaker tripped. Check error code if displayed.	Check the load, and then reset circuit breaker. Verify error condition, and then make the necessary correction.
Connected loads malfunction or overheat.	Connected loads do not accept modified sine wave output.	Loads incompatible with output from modified sine wave inverter. See Section 3.4.
Heavy spark when connecting battery power.	A normal condition. Occurs when the internal DC input capacitors (filter) are discharged after the battery was disconnected for at least 30-40 seconds.	A sudden high DC surge (inrush) current charges the internal big capacitors and quickly disappears (milliseconds) once capacitors are charged. Does not draw current from the battery.
Input battery under-voltage warning (E05) and/ or shutdown alarm (E01) occurs in advance even when the battery voltage seems to be OK.	Ensure you are measuring the voltage directly at the DC input terminals of the unit—check the possible voltage drop between the battery posts and the unit's input terminals.	Excessive voltage drop between the battery bank and the inverter may be due to high resistance of the DC wires, the battery disconnect switch is turned off, or a faulty fuse/DC breaker. Ensure recommended wire gauge and length are used. Use fuses (or DC breakers) with very low voltage drop (e.g., ANL type fuses, etc.).
	Battery bank with high internal resistance, resulting in a voltage drop proportional to the DC current draw from the unit.	Excessive battery voltage drop due to an overdraw of current in relation to battery bank capacity. Increase the battery bank capacity (i.e., add more batteries in parallel) and/or reduce the load being fed by the inverter. Battery damaged and is not able to keep a good state of charge—replace.
	Battery bank is getting discharged.	Normal condition. An E05 warning followed by an E01 shutdown occurs while the battery bank is getting discharged—recharge.

5.0 Specifications

Table 5-1, CMW3012H Specifications

Model:	CMW3012H
Electrical Specifications	
Continuous Power[1]	3000 W
Surge Power (Peak)[2]	6000 W
AC Output Voltage (12.5V)	120 VAC RMS ± 5%
AC Output Current	25.0 AAC
AC Output Voltage Range	104-127 VAC
AC Output Frequency	60 Hz ± 0.5 Hz
AC Output Waveform)	Modified sinewave (<3% THD)
AC Output Receptacle	NEMA 5-20, Dual GFCI with LED
Optimum Efficiency	>90%
DC Input Voltage (Nominal)	12.5 VDC
DC Operation Voltage Range[3]	10.5-15.5 VDC
DC Input Current (Full Load)	38 ADC
DC Input Current (No Load)	<1.5 ADC
Protection	
Low Voltage Alarm (SdL/SdH)	11.0/12.1 VDC
Low Voltage Alarm Recovery (SdL/SdH)	11.3/12.3 VDC
Low Voltage Shutdown (SdL/SdH)	10.5/11.8 VDC
Low Voltage Shutdown Recovery (SdL/SdH)	12.0/12.6 VDC
High Voltage Shutdown[3]	15.5 VDC
USB Port	
USB Port	5 VDC, 750 mA
AC Output	
AC Output: L/N (Hardwire)	25 AAC Max
AC Output: GFCI Outlet	20 AAC Max
Display Panel	
LED Status Indicators	Status and Display
Digital display	DC volts in, power out, error codes
General Specifications	
Operating Temperature	32°F to 104°F (0°C to 40°C)
Inverter Weight	13.0 lb (5.9 kg)
Inverter Size (L x W x H)	19” x 9” x 4.5” (48.3 x 23 x 11.5 cm)
Warranty	One Year
Regulatory Approval	
Conforms to UL STD 458, certified to CSA STD. C22.2 No. 107.1	
EMI: FCC Part 15 Class B	

***Note[1]**: The specifications are met when the DC voltage is at nominal (12.5V) and the temperature is at 25°C.*

***Note[2]**: The surge ratings are based on a resistive load (output voltage may drop).*

***Note[3]**: Damage can occur if the input voltage exceeds 16 VDC.*

Appendix A – Battery Information

Battery Bank Sizing

The size of the battery bank determines how long the inverter can power the AC loads without recharging. The larger the battery bank, the longer the run time. Size your battery bank to the system's AC load requirements and the length of time required to run the load from the batteries. In general, the battery bank should not be discharged more than 50%.

Battery Types

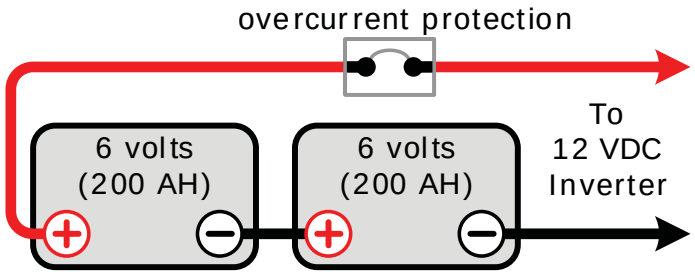
Batteries are available in different sizes, amp-hour ratings, voltage, and chemistries; they also come in liquid or gel, vented or non-vented, etc. They are also available for starting applications (such as an automobile starting battery) and deep discharge applications. Only the deep cycle types are recommended for inverter applications. Choose the batteries best suited for the inverter installation and cost. To ensure the best performance from your inverter system, batteries should be of the same size, type, rating, and age. Do not use old or untested batteries. For best performance, all batteries should be from the same lot and date. This information is usually printed on a label located on the battery.

Battery Configuration

The battery bank must be wired to match the inverter's DC input voltage specifications (12 VDC). In addition, the batteries can be wired to provide additional run time. The various wiring configurations are:

Info: The interconnecting DC wires must be sized and rated exactly the same as those used between the battery bank and the inverter.

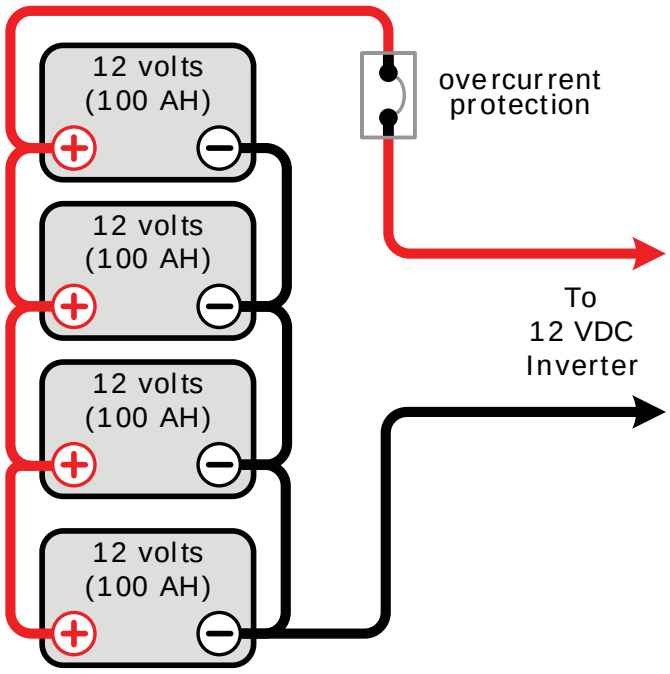
- **Series Wiring**
  Wiring batteries in a series increases the total battery bank output voltage. A series connection combines each battery in a string until the voltage matches the inverter's DC requirement. Even though there are multiple batteries, the capacity remains the same. In the example below (Figure A-1), two 6 VDC/200 AHr batteries are combined into a single string—resulting in a 12 VDC/200 AHr bank.



12-volt battery bank (total capacity = 200 AH)

Figure A-1, Series Battery Wiring

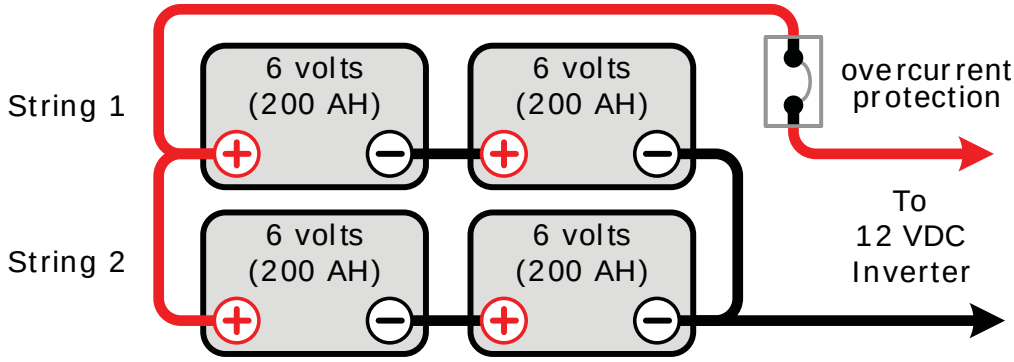
- **Parallel Wiring**
  Wiring the batteries in parallel increases the total run time the batteries can operate the AC loads. A parallel connection combines overall battery capacity by the number of batteries in the string. Even though there are multiple batteries, the voltage remains the same. In the example below (Figure A-2), four 12 VDC/100 AHr batteries are combined into a single 12 VDC/400 AHr battery bank.



12-volt battery bank (total capacity = 400 AH)

Figure A-2, Parallel Battery Wiring

- **Series-Parallel Wiring**
  A series-parallel configuration increases both voltage (to match the inverter's DC requirements) and capacity (to increase run time for operating the loads) using smaller, lower-voltage batteries. In the example below (Figure A-3), four 6 VDC/200 AHr batteries are combined into two strings resulting in a 12 VDC/400 AHr battery bank.



12-volt battery bank (total capacity = 400 AH)

Figure A-3, Series-Parallel Battery Wiring

Appendix B – Preventive / Periodic Maintenance

Recommended Inverter and Battery Care

The CMW3012H inverter is designed to provide you with years of trouble-free service. Even though there are no user-serviceable parts, it is recommended that every 6 months you perform the following maintenance steps to ensure optimum performance and extend the life of your batteries.

WARNING: Prior to performing these checks, switch both the AC and DC circuits OFF.

- Visually inspect batteries for cracks, leaks, or swelling – replace if necessary.
- When possible, recharge your batteries when they are about 50% discharged or earlier. This gives them a much longer life cycle than recharging when they are almost completely discharged.
- Use baking soda to clean and remove any electrolyte spills or buildups.
- Check and tighten all battery hold down clamps.
- Clean and tighten all DC terminals (battery and inverter) and connecting cables.
- If used, check and ensure the screws on the AC output terminals are tight.
- Check and fill battery water levels (Liquid Lead Acid batteries only).
- Check individual battery voltages (replace those that vary more than 0.3 VDC of each other).
- Check all cable runs for signs of chafing – replace if necessary.
- Check the inverter's cooling vents – clean as necessary to prevent the accumulation of dust and dirt.

RV / Marine Off-Season Storage

When placing your coach or boat into seasonal storage, it is recommended that you perform the following to ensure the system is properly shut down (or properly configured for seasonal storage). This is especially important for maintaining the batteries.

- Perform the recommended maintenance steps noted above
- Fully charge the batteries; if available, connect a battery charger to maintain the batteries
- Verify the inverter is switched OFF
- Switch OFF all unnecessary AC and DC loads

Appendix C – Regulatory and FCC Information

C-1 Regulatory Compliance

The CMW3012H has been tested and listed to UL 458, (Power Converters/ Inverters for use in the US; and certified to CSA C22.2 No. 107.1 (General Use Power Supplies) for use in Canada. Intertek Testing Services (known as ETL), a Nationally Recognized Testing Laboratory (NRTL), has tested and certified the CMW3012H to product safety standards. NRTL's meet Occupational Safety and Health Administration's (OSHA) regulations to perform independent safety testing and product certification.

FCC Information

The CMW3012H inverter has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful 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:

- Re-orient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Appendix D – Inverter Output Waveforms

D-1 Output Waveform

The inverter's output waveform is the shape of the wave that alternating current makes as its voltage rises and falls with time (see Figure D-1 below). The three basic output waveforms are:

- **Modified Sine Wave** – Also referred to as a "quasi sine wave" or a "modified square wave". This output looks like a one-step staircase and the waveform changes its width to continually provide the correct RMS output voltage regardless of the battery voltage. Most loads that run from a sine wave will also run from a modified sine wave. However, things such as clocks and furnace controllers may have trouble.
- **Sine Wave** – An AC waveform that looks like rolling waves on water. It rises and falls smoothly with time. The grid puts out a sine waveform. Any plug-in AC equipment will operate from a sine wave output inverter.
- **Square Wave** – The simplest AC waveform. Some types of equipment behave strangely when powered from a square wave inverter.

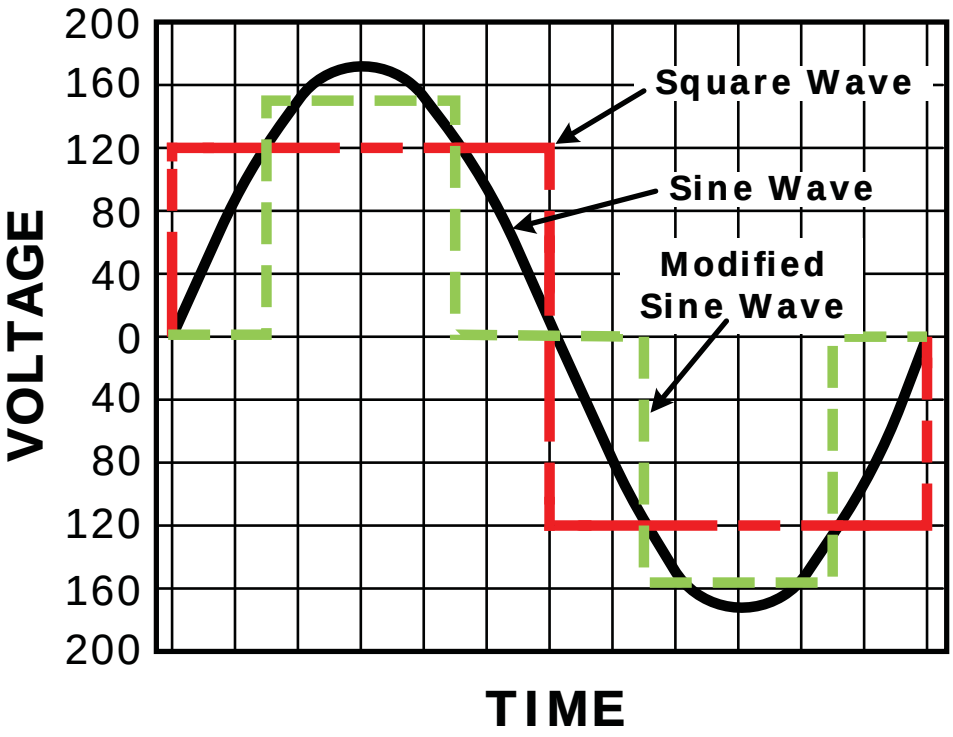


Figure D-1, AC Waveforms

Appendix E – Limited Warranty & Service

Sensata Technologies warrants the CMW3012H inverter to be free from defects in material and workmanship that result in product failure during normal usage, according to the following terms and conditions:

1. The limited warranty for this product extends for a maximum of 12 months from the product's original date of purchase.
2. The limited warranty extends to the original purchaser of the product and is not assignable or transferable to any subsequent purchaser.
3. During the limited warranty period, Sensata will repair or replace at our option any defective parts—or any parts that will not properly operate for their intended use—with factory new or remanufactured replacement items if such repair or replacement is needed because of product malfunction or failure during normal usage. The limited warranty does not cover defects in appearance, or cosmetic, decorative, structural or non-operative parts. Sensata's limit of liability shall be the actual cash value of the product at the time the original purchaser returns the product for repair, determined by the price paid by the original purchaser. Sensata shall not be liable for any other losses or damages.
4. Upon request, the original purchaser must prove the product's original date of purchase by a dated bill of sale, itemized receipt.
5. The original purchaser shall return the product prepaid to Sensata. After the completion of service under this limited warranty, Sensata will return the product prepaid to the original purchaser via a Sensata selected, non-expedited surface freight within the contiguous United States and Canada; this excludes Alaska and Hawaii.
6. If Sensata repairs or replaces a product, its warranty continues for the remaining portion of the original warranty period or 90 days from the date of the return shipment to the original purchaser, whichever is greater. All replaced products and parts become the property of Sensata.
7. This limited warranty is voided if:
    - the product has been modified without authorization
    - the serial number has been altered or removed
    - the product has been damaged from abuse, neglect, accident, high voltage or corrosion
    - the product was not installed/operated according to instructions

How to Receive Warranty Service

If your product requires warranty service, contact Sensata (Magnum-Dimensions) at:

- Telephone: 425-353-8833, or
- Email: MagnumWarranty@Sensata.com

If returning your product directly to Sensata (in Everett, WA), you must:

1. Return the unit in the original, or equivalent, shipping container.
2. Receive a Return Materials Authorization (RMA) number from Sensata prior to the return of the product for service.
3. Place RMA numbers clearly on the shipping container or the packing slip.

When sending your product for service, please ensure it is properly packaged. **Damage due to inadequate packaging is not covered under warranty.** We recommend sending the product by traceable and insured service.

BEFORE RETURNING ANY UNIT, A RETURN MATERIAL AUTHORIZATION (RMA) NUMBER IS REQUIRED

MAGNUM DIMENSIONS

Magnum-Dimensions Products

Manufactured by:

Sensata Technologies
2211 West Casino Rd.
Everett, WA 98204
Phone: 425-353-8833
Fax: 425-353-8390
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CMW3012H Owner's Manual (PN: 64-0078 Rev A)