KISAE

Modified Sinewave Power Inverter 1000/1500 MW 1210, MW1215

True Sinewave Power Inverter 1000/2000 SW 1210, SW 1220

Owner’s Manual

Modified Sinewave Series

True Sinewave Series

1. INTRODUCTION

Thank you for purchasing the KISAE Power Inverter. With our state of the art, easy to use design, this product will offer you reliable service for providing AC power and 5V USB power for your home, cabin, RV or Trailer. The KISAE Power Inverter can run many AC-powered appliances when you need AC power anywhere. The 5V USB power can charge many USB powered devices.
This manual will explain how to use this unit safely and effectively. Please read and follow these instructions and precautions carefully.

IMPORTANT SAFETY INFORMATION

This section contains important safety information for the KISAE Power Inverter. Each time, before using the KISAE Power Inverter, READ ALL instructions and cautionary markings on or provided with the inverter, and all appropriate sections of this guide.
The KISAE Power Inverter contains no user-serviceable parts. See Warranty section for how to handle product issues.

WARNING: FIRE AND/OR CHEMICAL BURN HAZARD

- Do not cover or obstruct any air vent openings and/or install in a zero-clearance compartment.

WARNING: FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN DEATH OR SERIOUS INJURY

- 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.
- Wear eye protection and gloves.
- Avoid touching your eyes while using this unit.
- Keep fresh water and soap on hand in the event battery acid comes in contact with eyes. If this occurs, cleanse right away with soap and water for a minimum of 15 minutes and seek medical attention.
- Batteries produce explosive gases. **DO NOT** smoke or have an open spark or fire near the system.
- Keep unit away from moist or damp areas.
- 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 that may create an explosion.

WARNING: Shock Hazard. Keep away from children!

- Avoid moisture. Never expose unit to snow, water etc.
- Unit provides 120 Vac, treat the GFCI output socket the same as regular wall AC sockets at home.

WARNING: Explosion hazard!

- DO NOT use the KISAE Power Inverter in the vicinity of flammable fumes or gases (such as propane tanks or large engines).
- AVOID covering the ventilation openings. Always operate unit in an open area.
- Prolonged contact to high heat or freezing temperatures will decrease the working life of the unit.

FCC INFORMATION

This equipment 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 generate, 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:

- Reorient 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.

LIMITATIONS ON USE

Do not use in connection with life support systems or other medical equipment or devices.

2. PRODUCT DESCRIPTION

The KISAE Power Inverter package includes the items list below.

- Power Inverter base unit (one of the following models)
  MW 1210: Power Inverter 1000 (Modified Sinewave)
  MW 1215: Power Inverter 1500 (Modified Sinewave)
  SW 1210: Power Inverter 1000 (True Sinewave)
  SW 1220: Power Inverter 2000 (True Sinewave)
- Owner's manual (P/N: MU MW1215)

3. INSTALLATION

<u>WARNING</u>: KISAE Technology recommends that all wiring be done by a certified technician or electrician to ensure adherence to the applicable electrical safety wiring regulations and installation codes. Failure to follow these instructions can damage the unit and could also result in personal injury or loss of life.

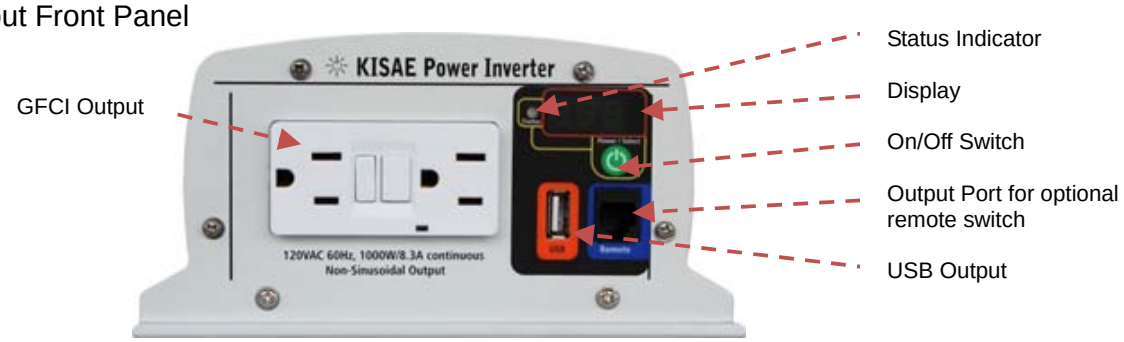
<u>CAUTION</u>:

Before beginning your KISAE Power Inverter Installation, please consider the following:

- The KISAE Power Inverter base unit should be used or stored in an indoor area away from direct sunlight, heat, moisture or conductive contaminants.
- When placing the unit, allow a minimum of three inches of space around the unit for optimal ventilation.

<u>Understanding the unit features</u>

AC Output Front Panel



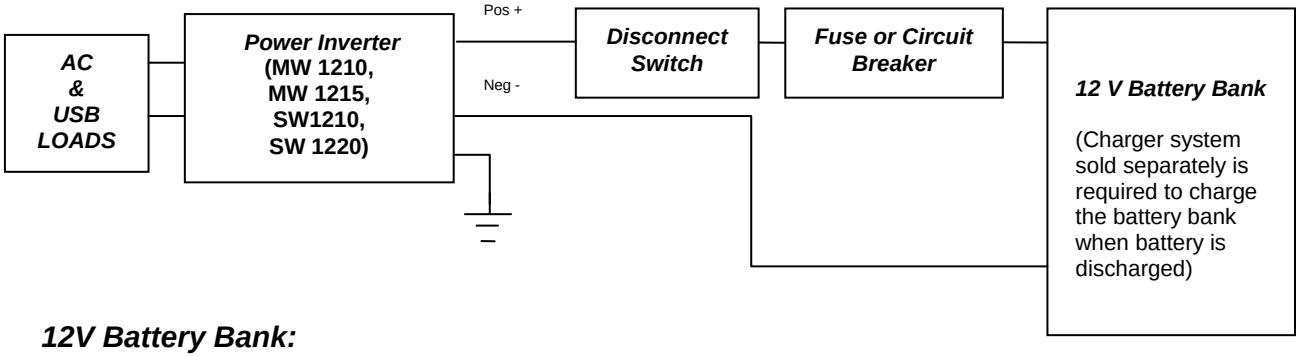
Picture shown MW1210

DC Input Rear Panel

Picture shown MW1210

Material Prepare for Installation

Typical Wiring block diagram of the Power Inverter:



12V Battery Bank:

- The use of deep cycle battery is highly recommended for power inverter application
- For battery size, you need to identify how much you will be using them between charges. KISAE do recommends you purchase as much battery capacity as possible. See more on Battery Run time and Load in Section 4.

Fuse or Circuit Breaker:

- DC-rated fuse or DC-rated circuit breaker connected along the DC positive line is required.
- For MW 1210, SW 1210, select a fuse or circuit breaker with a minimum of 150 Adc
- For MW 1215, select a fuse or circuit breaker with a minimum of 225 Adc
- For SW 1220, select a fuse or circuit breaker with a minimum of 300 Adc
- Based on the size of the battery bank chosen on the 12V Battery Bank above, determine the overall short circuit current rating of the battery bank from the battery manufacturer. The fuse or circuit breaker chosen has to be able to withstand the short circuit current that may be generated by the battery bank.

Disconnect Switch:

- Select a Disconnect Switch with the same or higher the rating of the selected fuse or circuit breaker from the above.
- The Disconnect Switch is used to disconnect the DC power between the power inverter and the battery bank during service, maintenance or trouble shooting.

DC Input and Grounding Cable:

- Use of low resistance wire is required for all the DC connections between the inverter and the battery bank.
- For MW 1210, SW 1210, uses minimum #2 AWG wire with maximum cable length of 5 feet.
- For MW 1215, use minimum #1/0 AWG wire with maximum cable length of 5 feet.
- For SW 1215, use minimum #2/0 AWG wire with maximum cable length of 5 feet.

Important: The unit is grounded through the ground stud of the unit located near the DC Input

terminal.

- For the grounding cable connected between the power inverter chassis to the earth ground, use a matching cable size as used on the DC Input Cable section.

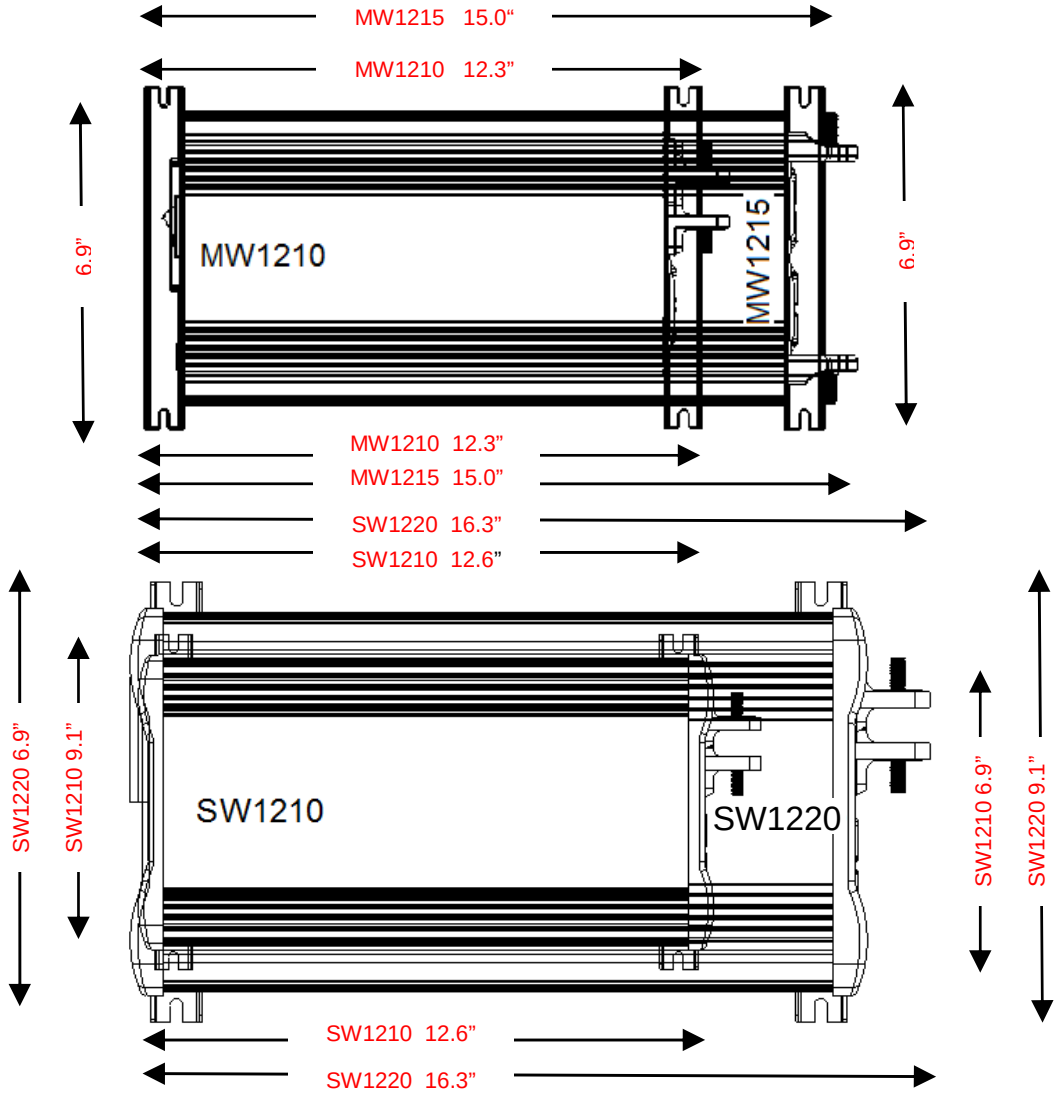
Installing the Power Inverter System

WARNING: Electrical Shock Hazard

The unit 'On/Off' switch does not disconnect the DC power from the battery. Use the DC Disconnect Switch or disconnect the DC input cables connection to disconnect the DC power from the battery before working on any circuits connected to the unit. Failure to follow these instructions can result in death or serious injury.

Power Inverter Installation:

- Choose an appropriate mounting location.
- For indoor use, the orientation of the unit can be mounted in any direction except with the DC Input panel facing downwards.
- For RV installation, the unit has to be mounted flat on horizontal surface.
- Use mounting template below to mark the positions of the mounting screws.
- Drill the 4 mounting holes and place the inverter in position and fasten the inverter to the mounting surface.



Power Inverter Chassis Grounding Connection:

DANGER: The Power Inverter has chassis to be grounded properly. Never operate the Power Inverter without properly grounded. Failure to do so will result in death or serious injury.

- Connect the grounding cable's ring terminal to the unit ground screw.

- Connect the other side of the cable to the common grounding point.

Power Inverter DC Input Connection:

<u>CAUTION</u>: Reverse the DC Input terminal will damage the unit and cannot be repaired. Damage caused by reverse polarity connection is not covered by the warranty.

- Connect one end of the negative DC input cable to the Power Inverter DC negative terminal. Connect the other end of the negative DC input cable to the battery negative terminal.
- Make sure the Disconnect Switch is in the OFF position.
- Connect one end of the positive DC input cable to the Power Inverter DC positive terminal. Connect the other end of the positive DC input cable to one of the terminal of the Disconnect Switch.
- Connect a DC input cable between the other terminal of the Disconnect Switch and one side of the terminal of the fuse holder.
- Connect a DC input cable between the other terminal of the fuse holder and the battery positive terminal.
- Install the selected fuse to the fuse holder.
- Turn Disconnect Switch to ON position.

Remote Switch (optional) Connection:

- Insert the Remote Switch to the RJ11 Remote Port located at the Front AC panel of the Power inverter. Please note polarity.

Test the Power Inverter connection:

- Turn unit on by pressing and holding the On/Off button on the main unit for about a second until a beep sound occur. The ‘Status’ light turns on indicating the KISAE Power Inverter is ON. Check the digital display show measured battery voltage and output power alternatively. Both AC output and 5V USB are now available.
- Plug in a small AC load like a 40W table lamp or small appliance to the AC socket to verify AC is available. If AC is not available, the GFCI may be tripped. Reset the GFCI by pressing the ‘RESET’ button.
- The unit is successfully installed and functioning properly.

Test the GFCI monthly:

- Use the following instruction to perform a monthly test on the GFCI to ensure the GFCI is functioning properly.
- Turn unit on and plug a small AC load (40W light bulbs) to the GFCI.
- Check the AC load is ON.
- Press ‘Test’ button and observe a click sound. Check AC load is turned off.
- Press ‘RESET’ button and check the AC load is back ON again.

4. UNIT OPERATION

<u>WARNING</u>: RISK OF EQUIPMENT DAMAGE

- For MW 1210, MW 1215: Do not plug surge-protected power bars into the unit's 120 VAC outlets. The surge protected components on the surge-protected power bar may not like the modified sine wave output generate by the inverter.
- Do not connect an AC power source like utility power or generator to the unit 120 VAC outlets.

Turn ON and OFF the 120 VAC and USB

- Press and hold the "Power/Select" button for 1 second until a beep is sounded. Display will show the measured battery voltage and output power alternatively. Status LED will turn green. Both 5V USB and 120 VAC are available.
- Press "Power/Select" button to turn unit off.

Remote ON /OFF (Optional)

- If optional remote is used, the Remote ON/OFF momentary switch is connected in parallel with the "Power/Select" button on the unit. Same procedure applies to ON and OFF the unit.

Understanding the Display & Status LED

Display:

'12.5' Display shows measured battery voltage
'0.80' Display shows total output AC power in kW (800W as shown)
'E01' Display shows error or warning code. See trouble shooting section in details

Status LED:

Green: Unit operation is normal
Amber: Warning is detected. Unit will shutdown at any time. Please check error code to troubleshoot the unit.
Red: Error is detected and unit has shutdown. Please check error code to troubleshoot the unit.

Understanding the Error Code

Code	Condition	Corrective Action
E01	Unit has sensed input under voltage and has shutdown	Recharge battery immediately and restart unit
E02	Unit has sensed input over voltage and has shutdown	Check battery voltage or if any external charger is connected to the battery bank
E03	Unit output has sensed overload or short circuit and was shutdown	Check load connected to the output. Reduce load and restart the unit
E04	Unit has sensed internal temperature was high and has shutdown	Turn unit off and wait for 15 minutes before restarting. Check if any object has blocked the air flow of the unit
E05	Unit has sensed input voltage is low and warning occurs	Recharge battery as unit will shutdown shortly
E06	Unit has sensed load connected is close to overload shutdown limit (Not applicable for MW1210, MW1215)	Reduce load
E07	Unit has sensed internal temperature is high and is close to thermal shutdown limit	Reduce load and check if any ventilation of the unit is blocked

AC Load on Power Inverter

Although the Power Inverter can provide high surge power up to two times the rated output power, some appliances may still trigger on the inverter protection system. A higher power inverter is required for those appliances.

For MW 1210, 1215 modified sinewave inverter, some appliances like speed controllers found in some fans, power tools and some power tools' AC charger may not like the modified sine wave

generate by the inverter, those appliances may not work or may be damaged if they are connected to the inverter. If you are unsure about powering any device with the inverter, contact the manufacturer of the device.

Estimate Run time on Load

Following run time is an estimate based on using a 12V-120AH battery bank for reference. Actual run time may vary.

Load	Consumption	Estimate Run time
Cordless Phone	5W	180 hrs
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

5. TROUBLESHOOTING

To trouble shoot the unit, please note the error code display on the main unit and review the “Understanding the Error Codes” in section 4.

Problem	Symptom	Solution
No output voltage. And Status LED is off.	The unit is off	Turn unit ON by following the instruction in Section 4 to turn unit ON
	No power to inverter	Check fuse or the Disconnect switch (if installed) is either blown or turn OFF
No AC output. Status LED is Green	GFCI was tripped	Check load and reset the GFCI
No Output. Status LED is in Amber	Check error code on display	Verify the error condition and make correction
Products connected to unit malfunction or overheat	Products connected to unit do not accept modified sine wave output (MW1210 & MW1215 only)	Products are not compatible with the modified sine wave output generated by the KISAE Power Inverter. See “AC Load on Power Inverter” in Section 4

6. SPECIFICATIONS

Note: Specifications are subject to change without notices.

Specification	***Modified Sinewave Series***		***True Sinewave Series***	
	MW 1210	***MW 1215***	***SW 1210***	***SW 1220***
Inverter				
AC Output Power	1000W	1500W	1000W	2000W
AC Output Current	8.3A	12.5A	8.3A	16.6A
AC Surge Power (Peak)	2000W	3000W	2000W	4000W
AC Output Voltage	120 VAC / 60 Hz			
AC Output Waveform	Modified Sinewave		True Sinewave	
Nominal DC Input Voltage	12.5 VDC			
No Load battery draw	< 0.6 ADC		< 1.2 ADC	
DC Input Voltage operating range	10.5 – 15.5 VDC			
Under Voltage Alarm	11.2 VDC			
Under Voltage Shutdown	10.5 VDC			
Under Voltage Recovery	11.8 VDC			
Over Voltage Shutdown	15.5 VDC			
USB	5V, 750 mA			
Safety and Environmental				
Conformance	Conforms to UL 458 Certified to CSA C22.2 no. 107.1			
Agency Markings	cETLus			
Operating Temperature	0°C to 40°C (32°F to 104°F)			
Storage Temperature	-20°C to 60°C (-4°F to 140°F)			
Relative Humidity	5-90% noncondensing			
Operating Altitude	Up to 9,843ft (3000 meters) above sea level			
Weights and Dimensions				
	5.3 lbs (2.4 kg)	6.9 lbs (3.1 kg)	6.0 lbs (2.7 kg)	11.5 lbs (5.2 kg)
Weights	MW 1210: 5.3 lbs (2.4 kg) MW 1215: 6.9 lbs (3.1 kg) SW 1210: 6.0 lbs (2.7 kg) SW 1220: 11.5 lbs (5.2 kg)			
Dimensions	MW 1210: 12.3 x 6.9 x 3.4” (31.2 x 17.5 x 8.7 cm) MW 1215: 15.0 x 6.9 x 3.4” (38.2 x 17.5 x 8.7 cm) SW 1210: 12.6 x 6.9 x 3.4” (32.1 x 17.5 x 8.7 cm) SW 1220: 16.3 x 9.1 x 4.3” (41.4 x 23.0 x 11 cm)			