



OFF GRID SERIES UPS 4.8kWh/7.2kWh/9.6kWh/12kWh
 (Uninterruptible/Backup Power Supply)



Safety Rules

 Hi-voltage	System must be OFF when connecting AC and DC inputs Do NOT operate in extreme weather conditions (lightning, etc)
 Attention	Fully isolated DC & AC circuit terminals
 Attention	Must ground connection before switching ON
 Attention	When replacing modules ensure all module LED lights are OFF

IMPORTANT SAFETY INSTRUCTIONS

This manual contains important safety instructions that must be followed during the installation and operation of this product. **READ THIS MANUAL THOROUGHLY:** The operator is responsible for proper and safe use of this equipment. The manufacturer strongly recommends that the operator read and thoroughly understand the instructions and contents of this owner's manual before attempting to use the equipment. If any portion of this publication is not understood, contact the nearest Authorized Service Dealer for starting, operating and servicing procedures. **SAVE THESE INSTRUCTIONS:** The manufacturer suggests that this manual and the rules for safe operation be copied and posted near the unit's installation site. Safety should be stressed to all operators and potential operators of this equipment.

SAFETY: Throughout this manual, and on tags and decals affixed to the unit,

DANGER, WARNING, CAUTION and NOTE blocks are used to alert personnel to special instructions about a particular operation, function or service that may be hazardous if performed incorrectly or carelessly. Observe them carefully. Their definitions are as follows:



DANGER INDICATES A HAZARDOUS SITUATION OR ACTION WHICH, IF NOT AVOIDED, **WILL** RESULT IN DEATH OR SERIOUS INJURY.



WARNING Indicates a hazardous situation or action which, if not avoided, **could** result in **death or serious injury**.



CAUTION Indicates a hazardous situation which, if not avoided, **could** result in **minor or moderate injury**.



NOTE - Indicates an important statement. Follow these instructions closely.

ATTENTION - Electrostatic Sensitive Devices. Observe handling precautions.

Four commonly used safety symbols accompany the DANGER, WARNING and CAUTION blocks. The type of information each indicates is as follows:



This symbol points out a potential Explosion Hazard.



This symbol points out a potential Fire Hazard.



This symbol points out a potential Electrical Shock Hazard.

These “Safety Alerts” cannot eliminate the hazards that they signal. Strict compliance with these special instructions, plus common sense are major accident prevention measures.

Study these safety rules carefully before operating or servicing this equipment. Become familiar with this Owner’s Manual and with the unit. The Unit can operate safely, efficiently and reliably only if it is properly installed, operated and maintained. Many accidents are caused by failing to follow simple and fundamental rules or precautions. The manufacturer cannot anticipate every possible circumstance that might involve a hazard. The warnings in this manual, and on tags and decals affixed to the unit are, therefore, not all-inclusive. If using a procedure, work method or operating technique the manufacturer does not specifically recommend, ensure that it is safe for personnel. Also make sure the procedure, work method or operating technique utilized does not render the unit unsafe. Despite the safe design of this unit, operating this equipment imprudently, neglecting its maintenance or being careless can cause possible injury or death. Permit only responsible and capable persons to install, operate and maintain this equipment. **Potentially lethal voltages are generated by these units.** Ensure steps are taken to make the unit safe before attempting to work on the unit. The installation of this unit must always comply with applicable codes, standards, laws and regulations.

General Safety Hazards

For safety reasons, this equipment should only be installed, serviced and repaired by a Service Dealer or other competent, qualified electrician or installation technician who is familiar with applicable codes, standards, regulations and product Installation Manual guidelines. The operator also must comply with all such codes, standards, regulations and product Installation Manual guidelines.

This unit is designed for INDOOR installation ONLY. Never operate the unit outside without the proper NEMA enclosure.

Electrical Hazards

All units covered by this manual produce dangerous electrical voltages that can cause fatal electrical shock. Utility and battery power delivers extremely high and dangerous voltages when installed, as does the HUMLESS unit when it is in operation. Avoid contact with bare wires, terminals, connections, etc. while the unit is running. Ensure all appropriate covers, guards and barriers are in place, secured and/or locked before operating the unit. If work must be done around an operating unit, stand on an insulated, dry surface to reduce potential shock hazard. Do not handle any kind of electrical device while standing in water, while barefoot, or while hands or feet are wet. **DANGEROUS ELECTRICAL SHOCK MAY RESULT.**

To prevent injury, before working on this unit (for inspection, service or maintenance), always put the unit into the OFF mode.

In case of accident caused by electric shock, immediately shut down the source of electrical power. If this is not possible, attempt to free the victim from the live conductor.

AVOID DIRECT CONTACT WITH THE VICTIM. Use a non-conducting implement, such as a dry rope or board, to free the victim from the live conductor. If the victim is unconscious, apply first aid and get immediate medical help.

Never wear jewelry when working on this equipment. Jewelry can conduct electricity resulting in electric shock.

Fire Hazard

For fire safety, the generator must be installed and maintained properly. Installation **MUST** always comply with applicable codes, standards, laws, regulations and product Installation Manual guidelines. Adhere strictly to local, state, and national electrical and building codes. Comply with regulations the Occupational Safety and Health Administration (OSHA) has established. Also, ensure that the unit is installed in accordance with the manufacturer's instructions and recommendations. Following proper installation, do nothing that might alter a safe installation and render the unit in noncompliance with the aforementioned codes, standards, laws and regulations. All electrical work must be performed in accordance with local, state and federal electrical codes. Read all instructions and safety information contained in this manual before installing or using this product. This product is designed for indoor / compartment installation. It must not be exposed to rain, snow, moisture or liquids of any type. Use insulated tools to reduce the chance of electrical shock or accidental short circuits. Always disconnect the energy source prior to installing or performing maintenance on the system. Live power may be present at more than one point since our system utilizes both batteries and AC and DC. Always verify proper wiring prior to starting the unit. There are no user-serviceable parts contained in this product.

IMPORTANT BATTERY SAFETY INSTRUCTIONS

See Battery User Manual

Wear eye protection such as safety glasses when working with batteries.

Remove all jewelry such as rings, watches, bracelets, etc., when installing or performing maintenance on the unit.

Never work alone. Always have someone near you when working around batteries.

Use proper lifting techniques when working with batteries.

Never use old or untested batteries. Check each battery's label for age, type and date code to ensure all batteries are identical.

Do NOT mix and match batteries that are NOT from the same system.

Batteries are sensitive to changes in temperature. Always install batteries in a stable environment. Install batteries in a well ventilated area. Batteries can produce explosive gasses. For compartment or enclosure installations, always vent batteries to the outside.

Provide at least one inch of air space between batteries to provide optimum cooling.

Never smoke when in the vicinity of batteries. Always connect the cables to the batteries first. Use insulated tools at all times. Always verify proper polarity and voltage before connecting the batteries. To reduce the chance of fire or explosion, do not short-circuit the batteries.

NOTE: This unit is NOT intended nor certified to be a grid-tied system that sells power back to utilities. However, this unit can work as an Automatic Standby Generator, when an appropriate UL/ETL certified automatic transfer switch (ATS) is installed, the unit may start at any time when utility/grid power is lost. When this occurs, load circuits are transferred to the STANDBY (HUMLESS unit) power source. If this unit is used to power electrical load circuits normally powered by a utility power source, it is required by code to install a transfer switch. The transfer switch must effectively isolate the electrical system from the utility distribution system when the unit is operating (NEC 702). Failure to isolate an electrical system by such means will result in damage to the unit and also may result in injury or death to utility power workers due to back-feed of electrical energy. (See Technical White Paper 9/15 insert with instructions for connecting the unit with a transfer switch).

NOTE Every effort was made to make sure that the information and instructions in this manual were both accurate and current at the time the manual was written. However, the manufacturer reserves the right to change, alter or otherwise improve this product or manual at any time without prior notice.



Hi-performance, Hi-reliability OFF-GRID SERIES

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1. General Information

1.1 Introduction

Congratulations on your purchase of the Off-Grid Series from Humless. The Off-Grid Series is a pre-configured, turn-key drop-in back-up power system that includes everything you need for back-up power (chargers, inverters and light-weight advanced lithium). Powerful, yet simple to use, the Humless Off-Grid Unit will provide you with years of trouble-free performance all backed by our limited 8 year (96-month warranty).

The Off-Grid Series (OGS) is CE certified meeting the stringent requirements of UL1642, ensuring you the highest level of electrical safety and reliability.

Installation is easy. Simply connect the OGS output to your distribution circuits or electrical panel or remote load/appliance; [optional] connect your grid/shore power cable (AC) to the OGS's easy-to-reach AC terminal block; [optional] connect your solar cable (100-300VDC) to the OGS's easy-to-reach DC terminal block ; switch on the top battery, and then switch on the power.

Standard Features: •Advanced Lithium Battery Pack (LiFePO4) •Many Models (4.8kWh & 12kWh) •Pure Sine Wave Output (3kW) •RS485 Communication Port •Smooth, Aesthetically Pleasing Design •Listed to UL1642/CE

NOTE: When properly sized, this generator is suitable for supplying typical residential loads such as Induction Motors (sump pumps, refrigerators, air conditioners, furnaces, etc.), Electronic Components (computer, monitor, TV, etc.), Lighting Loads and Microwaves.

1.2 How it works

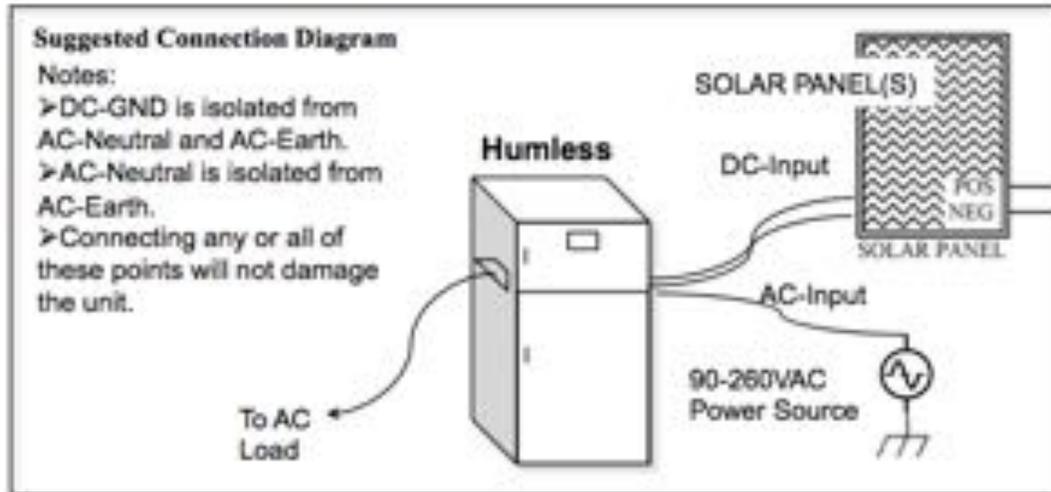
The Off-Grid Series is a turn-key all-in-one power source. The OGS contains a high quality Lithium battery (charged using either solar, wind or another generator). The OGS takes direct current (DC) from your solar panels and/or batteries and turns it into alternating current (AC), exactly like you use at home. It also takes alternating current when you are connected to

grid/shore power and transforms it into direct current to recharge your batteries AND it also passes it through to run the appliances you need as long as you are connected to AC power. If connected to AC the system will prioritize grid power but it will convert to inverter/battery output if grid/shore AC is off or over/under voltage. If connected to DC the system will prioritize the load and charge the battery with any balance. Excess DC power (above the load and battery charging) is available through the Excess DC power outlet/DC diversion load controller.

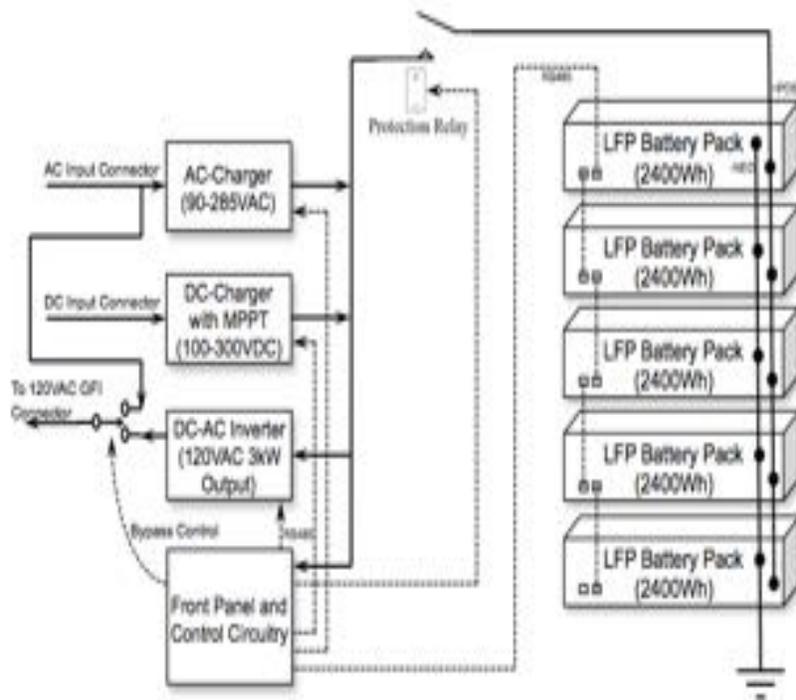
Appliances and Run Time

The OGS can power a wide range of appliances including small motors, hair dryers, fridges, freezers, and other electrical devices. As with any appliance using batteries for power, there is a certain length of time that it can run - this is called “run time.” Actual run time depends on several variables including the size and the type of appliance, as well as the battery capacity and age. Other factors such as the battery’s state of charge and temperature can also affect the length of time your appliances can run.

All electrical appliances are rated by the amount of power they consume. The rating is printed on the product’s nameplate label, usually located on its chassis near the AC power cord. Even though it is difficult to calculate exactly how long an inverter will run a particular appliance, the best advice is trial and error. Your OGS has a built-in safeguard that automatically protects your batteries from over charge/discharge.



Block Diagram: Humless Off-Grid Series



1.3 Specification Summary Index

Input						
	Item	Min	Typical	Max	Unit	Note
DC Charger	Input Voltage	100		300	Vdc	
	OutputRated Voltage		48		Vdc	
	Output Current			30	A	
AC Charger	Input Voltage	90	220	280	Vac	
	InputRated Voltage		120		Vac	
	InputVoltage frequency	57	60	63	Hz	
	Power Factor		0.99			
	Output Voltage		48		Vdc	
	Output Current			50	A	

Output						
	Item	Min	Typical	Max	Unit	Note
AC(OUT) Inverter	Output voltage	115	120	125	Vac	
	OutputRated Voltage		120		Vac	
	OutputVoltage Frequency	57	60	63	Hz	
	Output Current			30	A	
AC Bypass	OutputRated Voltage	90		164	Vac	AC first
	OutputVoltage Frequency		60			
	Output Current			30	A	
BAT+ BAT-(OUT)	Output Voltage		48		Vdc	Direct BAT output, Short/current limit protection
	Output Current		5		A	
DC1+ DC2+ DC3+ GND(OUT)	Output Voltage			300	Vdc	ExcessPowerShunt (when PV input exceeds the max DC charge needed)

Protection						
Item		Min	Typical	Max	Unit	Note
Each Module	Over Temperature	Yes				
	Output/Over Current	Yes, Over current and short protection				

BMS		
BMS	DC Charger	MPPT, charger with max power
	AC Charger	Constant current charge (CC), constant voltage (CV)
	Over/under Voltage Protection	Incl. with BMS

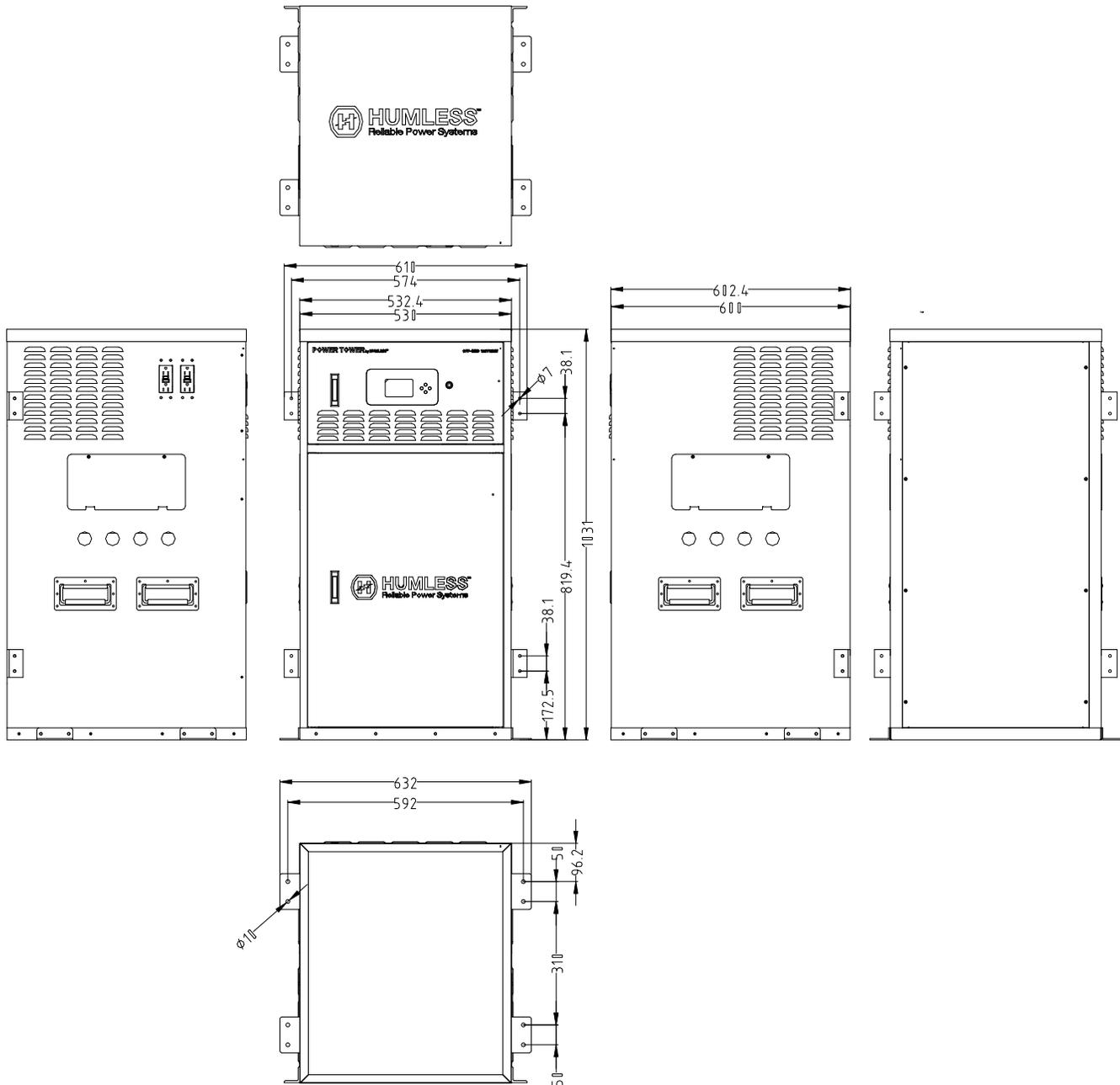
Insulation					
Item	Min	Typical	Max	Unit	Note
Input-Cabinet		2121		Vdc	DC charger, AC charger and inverter
Input-Output		2121		Vdc	
Output-Cabinet		750		Vdc	
Isolated Resistance	All the isolated resistance of input-output, input-earth and output-earth no less than 10MΩ (normal atmosphere, 90% humidity and 500Vdc test voltage).				

Environment (unit of measure noted)					
Item	Min	Typical	Max	Unit	Note
Working Temperature	-10		40	°C	
Extended Working Temperature	-20		50	°C	
Storage Temperature	-10		60	°C	
Humidity			90	%	
Atmosphere	70		106	KPa	

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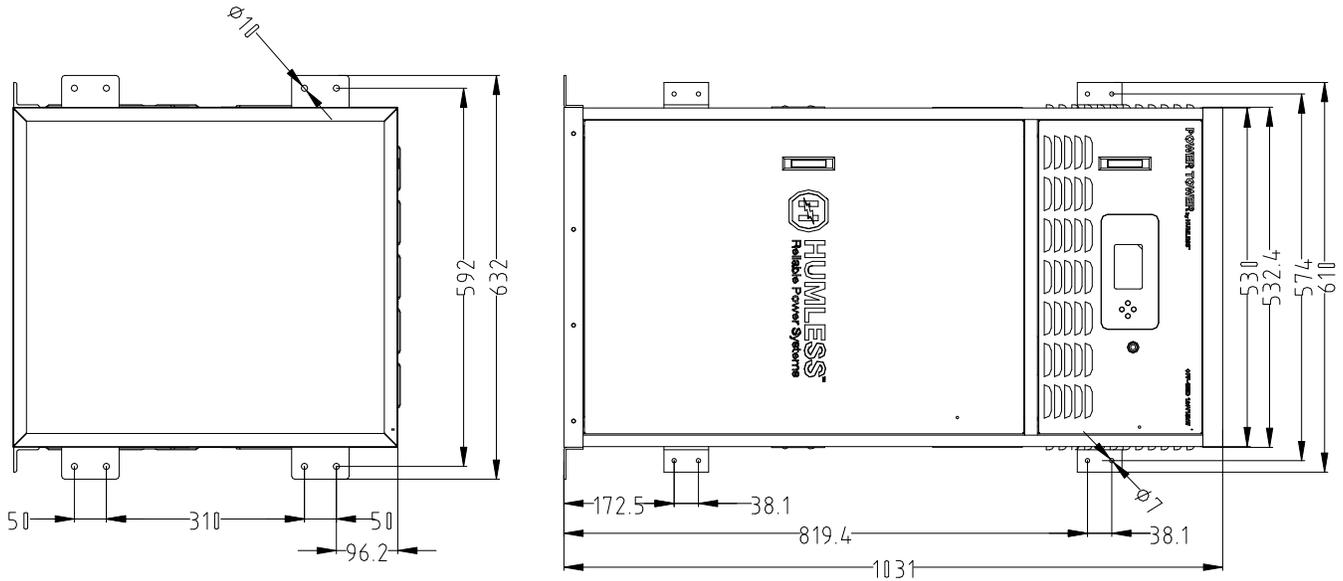
Altitude	0		3,000	M	
Cooling	Fan				
Dust/Water Proof	Dust diameter: >5um, density: $\leq 3 \times 10^4$ pcs/m ³ , non-conductive, non-magnetic and non-caustic. Not water proof				

Mechanical Characteristic	
Dimension	As per the drawing below
Weight	≤ 127 kg/245Kg



2. Installation Instructions

2.1 Installation Dimensions



2.2 Installation

Unpacking and Inspection

Carefully remove the OGS from its shipping container crate and inspect all contents. If items appear to be missing or damaged, contact Humless at (866) 476-2586 or your authorized Humless dealer. Retain the shipping container in the event the unit ever needs to be returned for factory service.

ATTENTION: Electrostatic Sensitive Devices. Observe handling precautions.

Pre-Installation

Before installing the unit, read all of the instructions and cautionary markings contained in this manual.

NOTE: The OGS is heavy. Use proper lifting techniques during installation to prevent personal

injury. A pallet jack/fork-lift is recommended.

Location for OGS

The OGS must be mounted in a clean, dry, ventilated environment where the ambient temperatures will not exceed 122 degrees F (50 degrees C). The location must be fully accessible and protected from exposure to heat producing devices. It must be securely fastened to a structural component.

Allow enough clearance to access the AC and DC Input & output connection points as well as the OGS's controls and status indicator.

The location must be fully accessible and protected from exposure to heat producing devices.

CAUTION: Never locate the OGS's dedicated batteries near any fuel tanks containing gasoline or propane.

Hardware / Materials Required

Conduit, strain-reliefs and appropriate fittings 1/4" mounting bolts and lock washers

Electrical tape

Wire ties

Tools Required

Wiring

Level

Pliers

Pencil or Marker

1/2" wrench Wire strippers

Multimeter

Pre-plan the wire and conduit runs. For maximum safety, run both AC and DC wires/cabling in separate conduit. Direct current wiring, due to its potential to generate RFI, should be tied together with electrical tape. Wiring and installation methods must conform to all applicable electrical codes.

DC Grounding

Ensure solar/photovoltaic (PV) installation conforms to all applicable electrical codes.

AC Main Panel

Always refer to electrical codes for safe wiring practices.

Circuit Protection

If using a AC sub-panel for distribution, always use breakers that provide the correct ampere branch circuit protection in accordance with the National Electric Code. The breakers must also be properly rated for the appliances that will be powered.

NOTE: Both AC and DC disconnects / overcurrent protection must be provided as part of the installation.

CAUTION: Always check for existing electrical, plumbing or other areas of potential damage prior to making cuts in structural surfaces, bulkheads or walls.

NOTE: Read all instructions and cautionary markings located at the beginning of this manual and in the pre-installation section, before installing the OGS.

Mounting

Position the OGS in the designated mounting location. Allow enough clearance to access the AC and DC connection points as well as the controls and status indicator. Also allow for air-flow in/to and around the OGS, especially near the vent openings on the side and front.

Secure the OGS to the mounting surface using appropriate bolts and lockwashers.

Battery Installation = N/A (NOTE: The OGS includes advanced Lithium batteries as part of an integrated system).

CAUTION: Allow at least 3” of space around the OGS to provide good air flow.

CAUTION: Do not mount the OGS near gasoline or propane fuel tanks. Mount the OGS only on “non-combustable” surfaces. Maximum ambient temperature **MUST NOT** exceed 113 °F (45 °C).

DC Wiring

Refer to the safety information at the beginning of the manual before proceeding. DC wires and cables should be tied together with wire ties or electrical tape approximately every 6 inches. Always refer to electrical codes for safe wiring practices.

WARNING: De-energize all sources of power including batteries (DC), grid/shore power (AC), and AC generator (if applicable).

CAUTION: The OGS is polarity protected however you *MUST* verify proper polarity *BEFORE* connecting to the OGS.

NOTE: *DO NOT* connect the input cables to the OGS until all wiring is complete and the correct DC voltage and polarity has been verified.

NOTE: Make sure cables have a smooth bend radius and do not become kinked. Place long cable runs in conduit and follow existing wire runs where possible.

DC Grounding

Always refer to electrical codes for safe wiring practices. Ensure all applicable codes are complied with or exceeded.

WARNING: During the installation and wiring process, cover exposed cable ends with electrical tape to prevent shorting the cables.

Wiring the OGS DC INPUT (refer to diagrams/pictures on the following pages)

WARNING: De-energize all sources of power including batteries (DC), grid/shore power (AC), and AC generator (if applicable).

DC wiring must be performed by a qualified person or licensed electrician.

DO NOT connect the OGS's output to an AC power source.

WARNING: Risk of electric shock. If an auto installation, Ground-fault circuit interrupters must be installed in the vehicle's wiring system to protect all branch circuits.

CAUTION: DO NOT place AC cabling in the same conduit with DC cabling.

NOTE: Read all instructions and cautionary markings located at the beginning of this manual and in the pre-installation section, before installing the OGS.

The installer must provide the appropriate circuit protection for the wire size used.

Refer to appropriate electrical codes for wire sizing and circuit protection.

Remove the OGS (INPUT) AC/DC access cover to access the internal terminal block.

Route the cable and conduit from the DC source (solar panels/combiner boxes) to the OGS's DC INPUT. Always leave a little extra slack in the wiring.

CAUTION: Check polarity and MAXIMUM/MINIMUM voltage range (10-300Vdc) before connecting solar input. Although the OGS is polarity protected you must verify this prior to connecting.



Connect the hot wire from the solar panels/combiner boxes to the “DC1+ or DC2+ or DC3+” terminal. Tighten the screw terminal to 16 inch-pounds.

Connect the negative wire from solar panels/combiner boxes to the “GND” terminal. Tighten the terminal to 16 inch-pounds.

CAUTION: Check polarity and MAXIMUM/MINIMUM voltage range (10-300Vdc) after connecting solar input.

AC Wiring

WARNING: De-energize all sources of power including batteries (DC), grid/shore power (AC), and AC generator (if applicable).

AC wiring must be performed by a qualified person or licensed electrician.

DO NOT connect the OGS’s output to an AC power source.

WARNING: Risk of electric shock. If an auto installation, Ground-fault circuit interrupters must be installed in the vehicle’s wiring system to protect all branch circuits.

CAUTION: DO NOT place AC cabling in the same conduit with DC cabling.

NOTE: Read all instructions and cautionary markings located at the beginning of this manual and in the pre-installation section, before installing the OGS.

The installer must provide the appropriate circuit protection for the wire size used.

Refer to appropriate electrical codes for wire sizing and circuit protection.

AC Input (Grid/Shore Power) Routing

Route 25-50 amp service (grid/shore power) to the OGS. If the installation includes a generator, route 25-50 amp service (grid/shore power) to an approved selector switch and then to the main AC panel. **Typical input = 50Amps.**

NOTE: Unit can be charged using 240Vac but you cannot take 120Vac out in BYPASS MODE if charging using 240Vac. If charging using 240Vac the Vac outlets will not have power. This is by deliberate design. If charging using 120Vac the Vac outputs will have power.

AC Input (Generator) Routing

Route 25-50 amp service (generator) to an approved selector switch and then to the main AC electrical panel. **Typical input = 50Amps.**

NOTE: Unit can be charged using 240Vac but you cannot take 120Vac out in BYPASS MODE if charging using 240Vac. If charging using 240Vac the Vac outlets will not have power. This is by deliberate design. If charging using 120Vac the Vac outputs will have power.

Main AC Input (Grid/Utility Power/Electrical Panel) Routing

NOTE: Unit can be charged using 240Vac but you cannot take 120Vac out in BYPASS MODE if charging using 240Vac. If charging using 240Vac the Vac outlets will not have power. This is by deliberate design. If charging using 120Vac the Vac outputs will have power.

Route the AC Output from the 25-50 amp breaker in the sub panel to the OGS's internal terminal block (INPUT).

OGS - AC Wiring Diagram (located on back of cover plate)

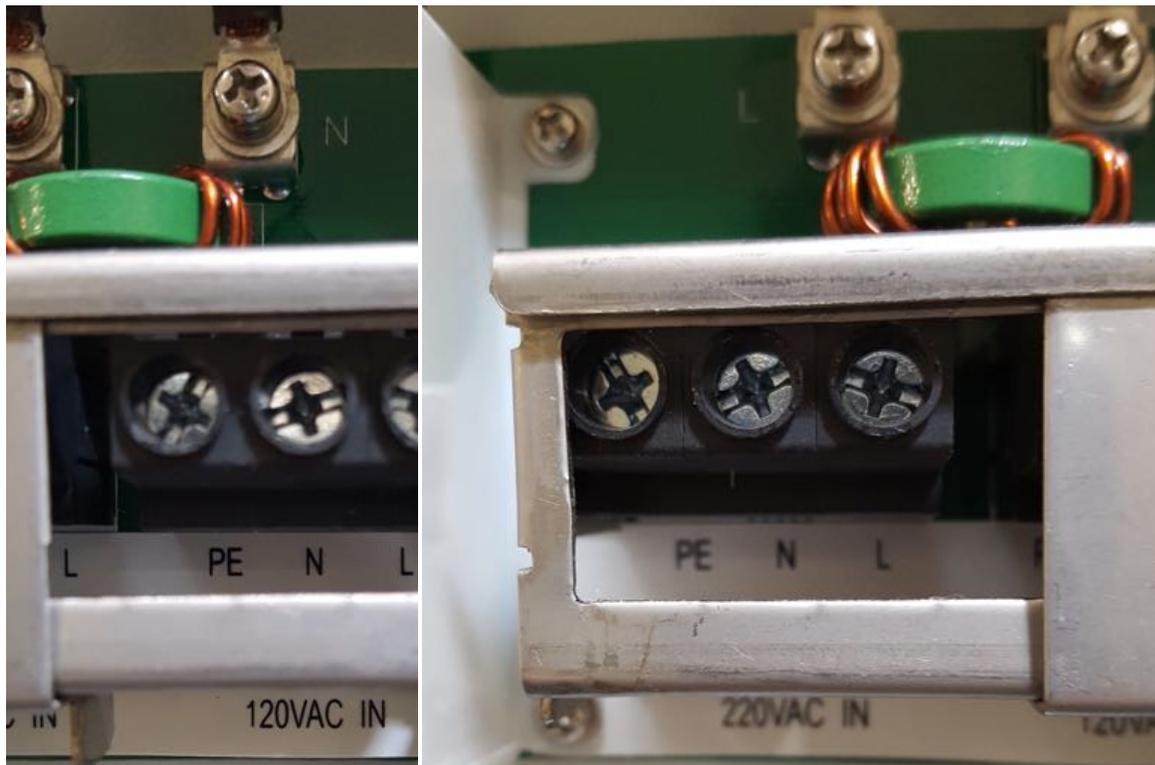
OGS - AC Terminal Block

Wiring the OGS AC INPUT (refer to diagrams on the following pages)

NOTE: Unit can be charged using 240Vac but you cannot take 120Vac out in BYPASS MODE if charging using 240Vac. If charging using 240Vac the Vac outlets will not have power. This is by deliberate design. If charging using 120Vac the Vac outputs will have power.

Remove the OGS (INPUT) AC/DC access cover to access the internal terminal block.

Route the cable and conduit from the main panel, approved bypass selector switch or main AC panel to the OGS's AC INPUT. Always leave a little extra slack in the wiring.



Connect the hot wire (BLACK) from the main panel's dedicated 25-50 amp breaker to the "AC

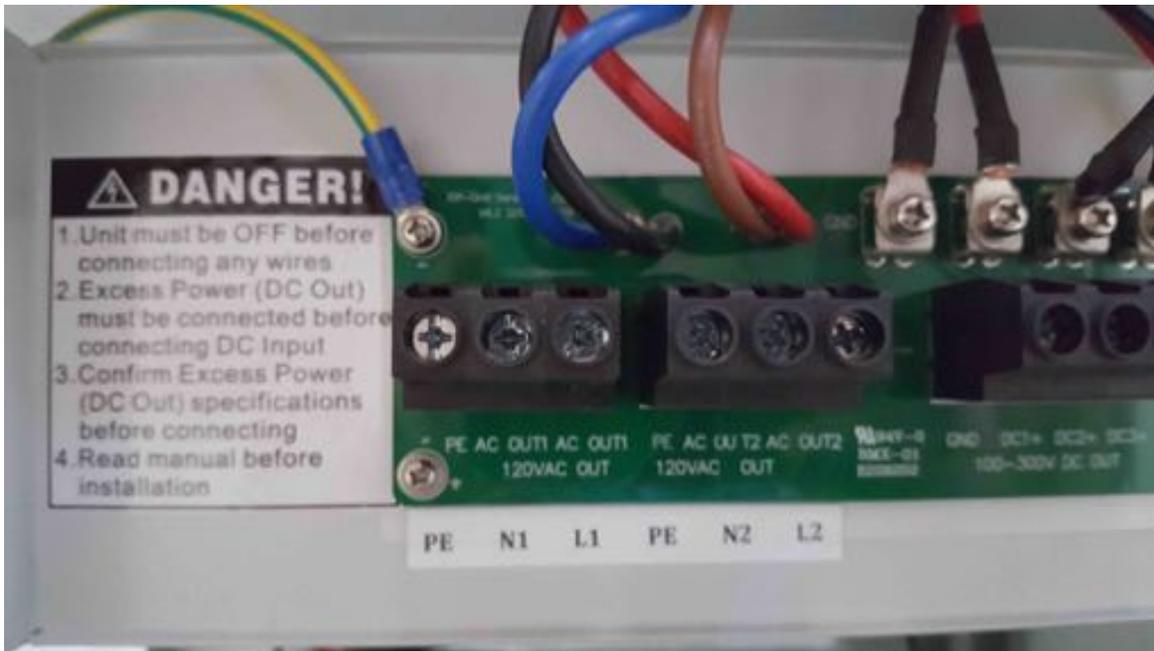
INPUT (L)” terminal. Tighten the screw terminal to 16 inch-pounds.

Connect the neutral (WHITE) from the main panel’s neutral bus bar to the “AC INPUT (N)” terminal. Tighten the screw terminal to 16 inch-pounds.

Connect the ground (GREEN) wire from the main panel’s neutral bus bar to the “GROUND/PE” terminal. Tighten the terminal to 16 inch-pounds.

Wiring the OGS AC OUTPUT (refer to diagrams on the following pages)

NOTE: Unit can be charged using 240Vac but you cannot take 120Vac out in BYPASS MODE if charging using 240Vac. If charging using 240Vac the Vac outlets will not have power. This is by deliberate design. If charging using 120Vac the Vac outputs will have power.



Route the cable and conduit from the AC (LOAD SIDE) distribution panel to the OGS’s AC (OUTPUT) conduit.

Connect the hot (BLACK) wire to the “AC OUTPUT L1 (HOT)” terminal. Tighten the terminal to 16 inch-pounds.

Connect the neutral (White) wire to the “AC OUTPUT 1 (N1)” terminal. Tighten the terminal to 16 inch-pounds.

Connect the ground (Green) wire to the “PE/GROUND” terminal. Tighten the terminal to 16 inch-pounds.

Final Inspection

NOTE: Unit can be charged using 240Vac but you cannot take 120Vac out in BYPASS MODE if charging using 240Vac. If charging using 240Vac the Vac outlets will not have power. This is by deliberate design. If charging using 120Vac the Vac outputs will have power.

NOTE: Verify the input & output phases are the same. Warranty is voided if not confirmed

Verify all AC/DC connections are correct and torqued to 16 inch pounds.

If applicable, replace the covers on the main electrical / distribution panel. Replace the OGS Input/Output access cover. Verify the OGS’s front panel switch is in the "OFF" position.

NOTE: If required by code, have the installation inspected by an electrical inspector.

Options

Excess Power Controller/Smart Shunt option - TBD

2.3 Start-up & Test

Activate Batteries

After all electrical connections have been completed, open the front bottom door to begin the start-up process (unscrew the side screws on the left-hand side of the unit {if facing the unit}).

ATTENTION: Verify correct battery voltage ~48Vdc at the bus bar using a multimeter.

ATTENTION: Verify correct Addresses of battery packs (In Descending order from Top #1 to Bottom #5 battery pack IF 12kWh; #2 IF 4.8kWh and so forth for interim battery capacity sizes)

Top #1 100000 (UP = 1, DOWN = 0)



Top #2 010000 (UP = 1, DOWN = 0)



Top #3 110000 (UP = 1, DOWN = 0)



Top #4 001000 (UP = 1, DOWN = 0)



Top #5 101000 (UP = 1, DOWN = 0)



ATTENTION: Check all RS485 cables are firmly inserted into each battery
Insert a pencil/pen into the "RESET" hole on the top battery ONLY.



Remove pencil/pen. The top battery LED indicator lights will begin to blink. As communication is established the other batteries will begin to be activated and their respective LED lights will begin to blink.

NOTE: There may be a small noise when the battery is activated. This is a normal condition. Close and secure the battery enclosure by screwing the door securely in place.

Final Inspection and Power-up

Prior to starting the OGS, make sure all connected loads/appliances are switched OFF or disconnected from the AC receptacles. Use a multi-meter to verify 48VDC at the OGS’s small pin VDC connector [Output side].

Switch the OGS’s main power switch to ON (Top Front Outside of unit. The stainless steel on/off switch to the R-hand side of the LED display).

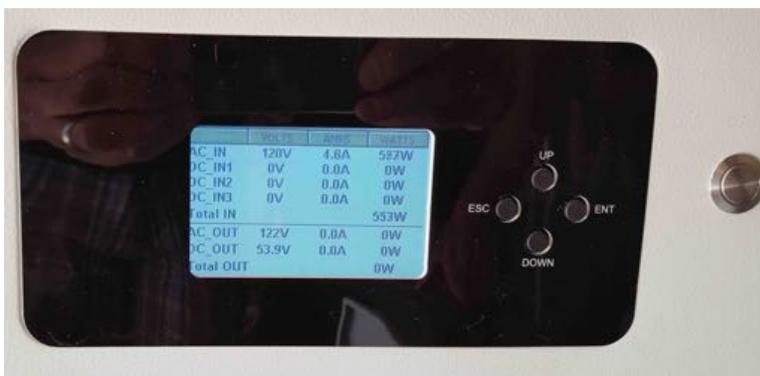
The display will indicate the battery capacity and a placeholder “Time to Empty” number (assuming internal power consumption)



The example above shows battery capacity of 38% and 76hrs 30min.

Use a true RMS multimeter to verify 120 VAC at the OGS’s AC outlets.

Verify the OGS’s LED shows AC IN (if connected to grid/shore power) by pushing the DOWN button (R-hand side of the LCD display).



Verify the OGS’s LED shows DC IN (if connected to DC power {Solar/PV, other}) by pushing the DOWN button (R-hand side of the LCD display).

Configuring the OGS = NOT APPLICABLE

Fault or Alarm Conditions

The OGS monitors the AC Grid/Shore Power, the batteries, the DC Power and itself. Whenever a condition occurs that is outside the normal operating parameters, the OGS will take the necessary steps to protect your appliances, batteries or itself from damage.

Low Battery

Whenever the battery voltage reaches a low level, the inverter will initiate Low Battery Cutoff which automatically shuts the inverter down, along with all connected loads, to protect the batteries from over-discharge damage. The OGS LED turns OFF to indicate the fault condition.

High Battery

As the inverter is charging, it constantly monitors the batteries. In the event the battery voltage approaches too high of level, it automatically turns off the battery charger to protect the batteries from damage.

NOTE: High battery voltage may be caused by excessive voltage from the alternator, solar panels or other external charging sources.

Overload

During operation, the inverter monitors the AC and DC circuits. In the event of a short-circuit or overload condition, the OGS will shut down. The OGS's LED turns OFF to indicate the fault condition.

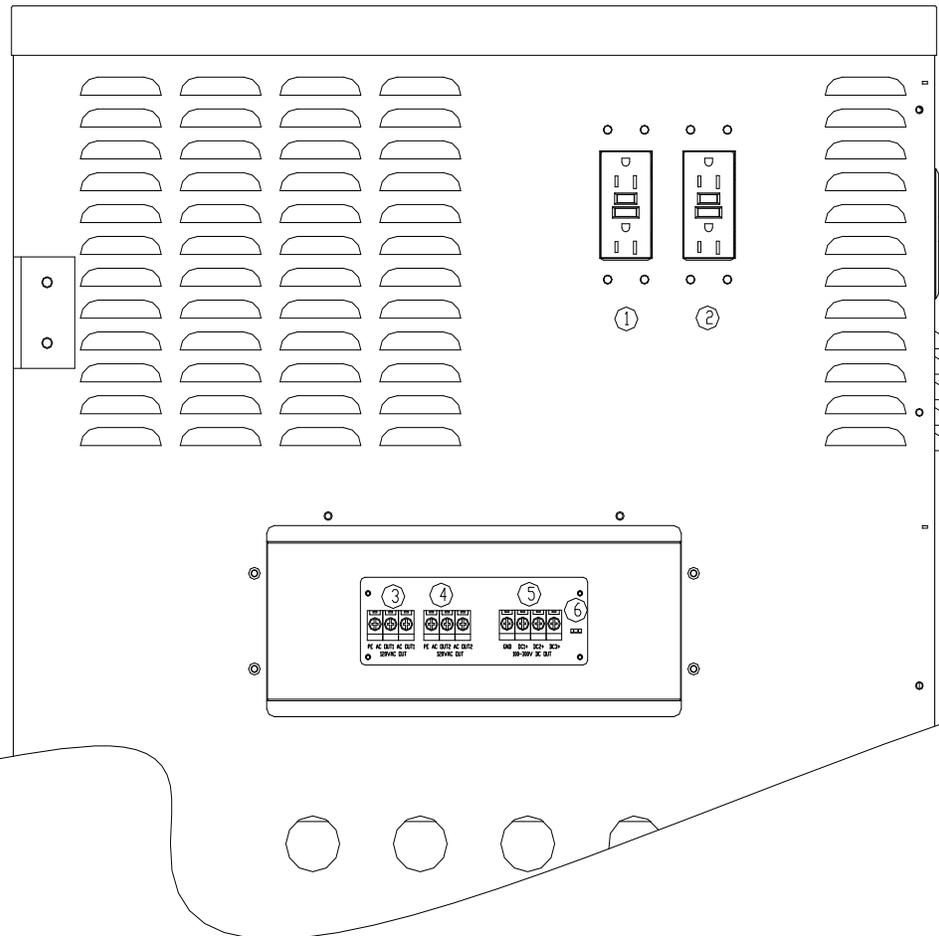
Over/Under-temperature

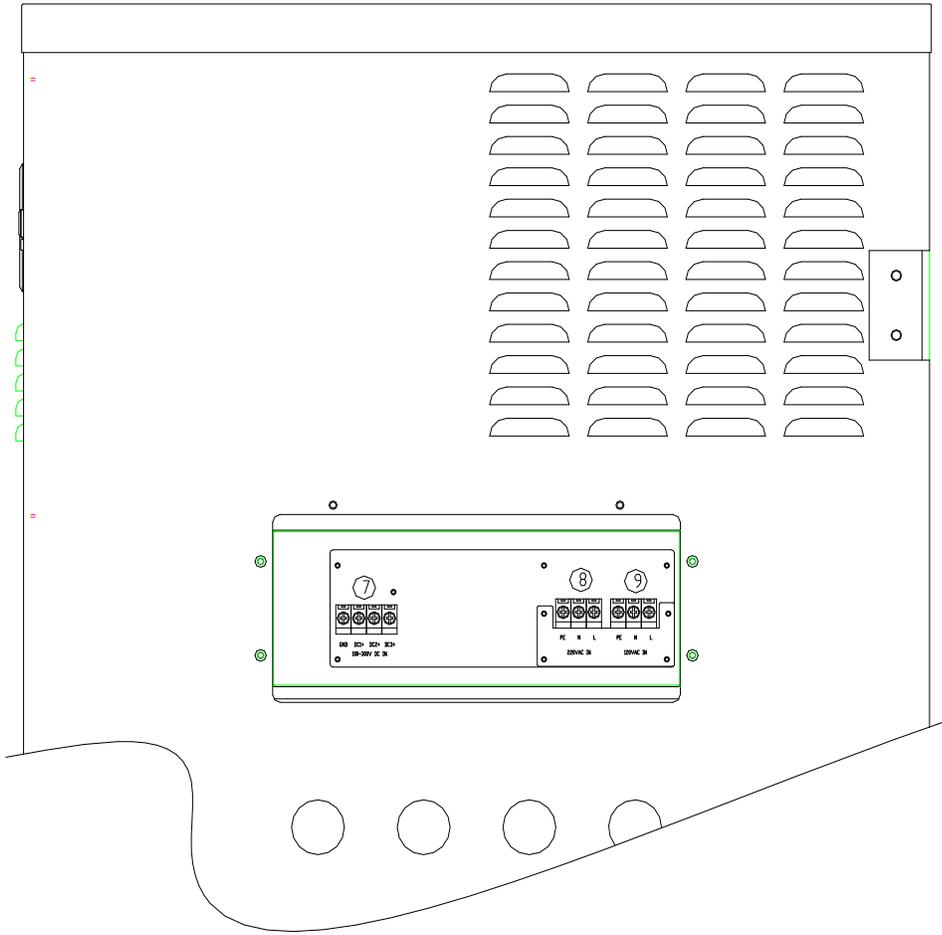
During operation, if the inverter/charge becomes over/under-heated, it will shut down to protect itself from damage. The OGS LED turns OFF to indicate the fault condition.

3. Electrical Connections (INPUT, OUTPUT)

Definition for each number on the pictures below:

- 1-4: 120Vac output
- 5: PV output
- 6: Battery output
- 7: PV input
- 8: 220Vac input
- 9: 120Vac input





4. Monitoring Module-Front Panel

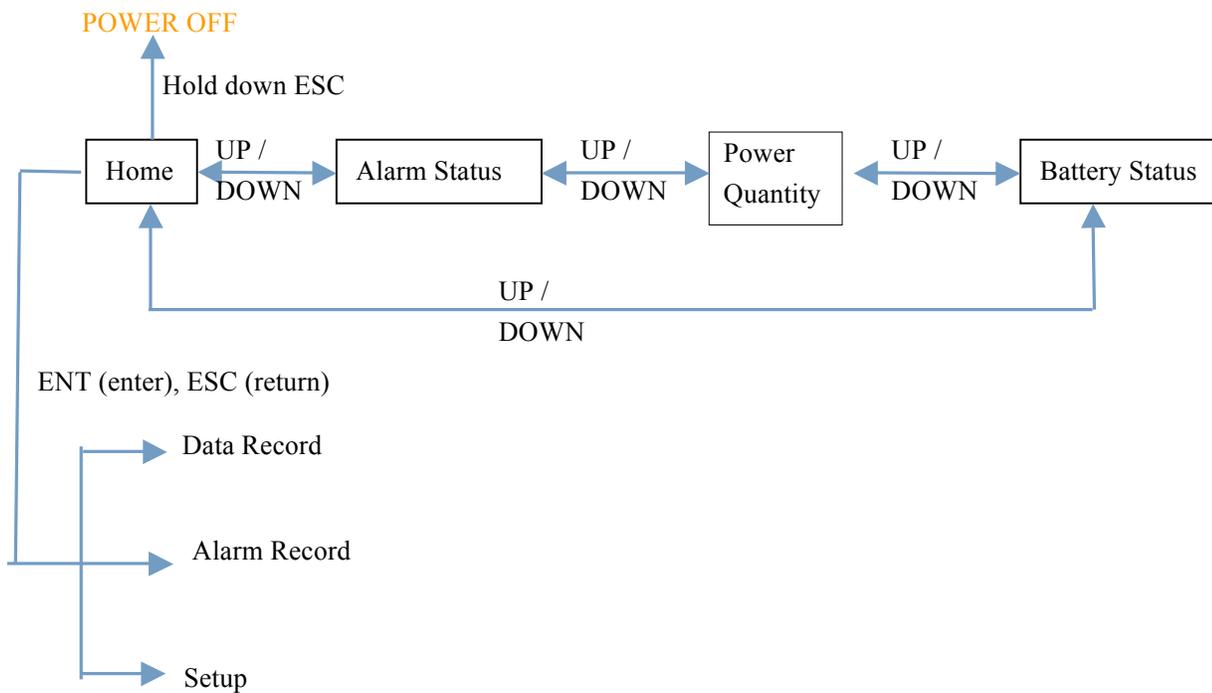
4.1 LCD

✓ Interface

- (1) AC CHARGER: Input voltage/current, alarm status
- (2) DC CHARGER: Input voltage/current, alarm status
- (3) AC INVERTER: Output voltage/current, alarm status
- (4) DC output voltage/current/power
- (5) Battery: Current, remaining time and history record of charge/discharge, voltage, status
- (6) System input/output power, system status and alarm record
- (7) Working power curve graph of AC CHARGER、DC CHARGER and AC INVERTER

✓ Operation

The system uses simple buttons for navigation. There is an ON button for starting the system, the 4 other buttons (UP, DOWN, ENT, ESC) are for more detail.



BASIC TROUBLESHOOTING

The OGS is a fairly simple device to troubleshoot. The following chart is designed to help you quickly pinpoint the most common alarms. **WARNING:** De-energize all sources of power including batteries (DC), AC generator (AC IN) or Loads (AC Out) (as applicable).

✓ **Alarm**

Number	Definition
0	AC power-off
1	DC input over voltage
2	DC input under voltage
3	Output over voltage of rectifier
4	Output under voltage of rectifier
5	Over temperature protection
6	Over current for inverter
7	Output short
8	Fan failure
9	Fuse failure
10	Over temperature of battery group
11	Over temperature of battery pack
12	Over voltage of battery cell
13	Under voltage of battery
14	Under Voltage of single battery cell
15	Over current of battery charge
16	Over current of battery discharge
17	Over temperature of battery charge
18	Over temperature of battery discharge
19	Low temperature of battery charge
20	Lower temperature of battery discharge
21	Low battery capacity
22	Voltage sensor's failure
23	Temperature sensor's failure
24	Charge short
25	Discharge short
26	Single battery cell's failure
27	Input over/under voltage of inverter
28	Output over/under voltage of inverter
99	Communication failure of module

4.2 Parameters

Item	Unit	Min	Typical	Max
Alarm Record	Article	0	--	999
Daily Data	Day	0	--	31
Monthly Data	Month	0	--	12
Annual Data	Year	0	--	10
Detectable Charge/discharge Current	A	0	--	80A
Detectable 48VDC Current	A	0	--	6A

Communication method: RS485

4.3 System Power-off/Standby

Push & hold down “ENT” button until system goes into Hibernation Mode (to reduce the battery’s power consumption).

Push & hold down “ESC” button until the system goes turns OFF (battery will still consume some power but with very low power consumption).

ATTENTION: To store the system also open the bottom front panel door and manually switch OFF each battery pack (insert pen/pencil into reset button and hold until battery pack switches OFF = no blinking lights). Repeat for each pack.

4.4 Software Update

Insert Micro SD with the firmware, then push both “UP” and “DOWN” at the same time, LCD will appear “Restart to update the device firmware” and the system will cut off automatically. Manually start the system and it will finish updating the software.

5. System Maintenance & Battery Care

1. Fault phenomenon: system start-up failure

Solution: Check if battery lights are on or off (if OFF then manually start the top battery pack). Connect AC or/and PV input to activate the battery.

2. Fault Phenomenon: Communication Failure of PV, AC charger and inverter

Solution: Make sure that each module is inserted in place.

NOTE: The Off-Grid Series inverter/ charger is designed to provide you with years of trouble-free service. Even though there are no user-serviceable parts, it is recommended that every 3 months you perform the following maintenance steps to ensure optimum performance and extend the life of your system.

NONE needed if system is operating/charging/discharging.

WARNING: Prior to performing these checks, switch both the AC and DC INPUT and OUTPUT circuits are OFF/disconnected.

Storage

WARNING: DO NOT STORE THE OGS FOR LONGER THAN 6 MONTHS. THIS WILL VOID THE WARRANTY

Perform the recommended maintenance steps above

Fully charge the batteries

Switch OFF all AC and DC loads

Disconnect system from loads/charging

Open bottom front panel. Use pen/pencil and push down on the RESET button for 5 seconds until each battery turns itself OFF (no blinking lights). Repeat this for EACH and EVERY battery pack.

Close front bottom panel.

Switch OFF unit by pushing down on the ESC button UNTIL the unit switches itself OFF

Do NOT store for longer than 6 months. WARRANTY WILL BE VOIDED

Do NOT store in conditions of less than 0 degrees Celcius (32 degrees Farenheit)

6. WARRANTY

96 Month Limited Warranty

Humless LLC., warrants the Off-Grid Series (OGS) 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 the product extends for 96 months beginning 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, Humless will repair, or replace at Humless's option, any defective parts, or any parts that will not properly operate for their intended use with factory new or rebuilt 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, cosmetic, decorative or structural parts or any non-operative parts. Humless's limit of liability under the limited warranty 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. Humless shall not be liable for any other losses or damages.
4. Upon request from Humless, 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 Humless in Lindon, UT. Humless will return the product prepaid to the original purchaser after the completion of service under this limited warranty.
6. 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 through abuse, neglect, accident, high voltage or corrosion.
- WARRANTY WILL BE NULL AND VOID UNLESS HUMLESS PRODUCT IS INSTALLED BY A LICENSED AND TRAINED ELECTRICIAN.
- WARRANTY WILL BE NULL AND VOID UNLESS HUMLESS PRODUCT IS INSTALLED 30 DAYS AFTER DELIVERY.
- WARRANTY WILL BE NULL AND VOID UNLESS HUMLESS PRODUCT IS INSTALLED AND OPERATED AS PER HUMLESS USER MANUAL.
- WARRANTY WILL BE NULL AND VOID IF LOCAL COUNTRY ELECTRICAL CODES ARE NOT OBSERVED
- WARRANTY WILL BE NULL AND VOID IF TEMPERATURE RANGES ARE NOT OBSERVED

IN CASE OF WARRANTY FAILURE, CONTACT HUMLESS LLC FOR A RETURN AUTHORIZATION (RMA) NUMBER BEFORE RETURNING THE UNIT FOR REPAIR.

1374 WEST 200 SOUTH LINDON, UT 84042.

Toll Free Phone: 866-476-2586

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