

ECO VOLT
UPS (SOLAR series)



USER MANUAL

MODEL: SOLAR 4024, SOLAR 4048, SOLAR 5024,
SOLAR 5048, SOLAR 6024, SOLAR 6048

Solar Power Inverter

Problem	Possible cause	Solution
battery lowvoltage	run out of battery	continue to charge battery full
	battery lower to 10v at machine off status, battery damaged	change new battery
battery overvoltage	machine fault/battery connection fault	check machine, and check if battery connection correct.
overload	connected more loads	turned off inverter,remove some loads
	connected big motor load	start power of motor load is huge,3-4 times of load itself,pls choose the correct load
over temperature	The surrounding environment space is small	keep environment unobstructed
	machine does not turn off but overload	check Fan at normal working remove some loads
over charge	machine fault/machine "select" switch at wrong position	set "selcet" switch at correct position
without output	red power button wrong.	check red power button at right place.
	machine inside wire connection not correct	check LED lights if normal to confirm inside wire connection
	machine components damaged	open machine case to check components
without charge	machine "select" switch at wrong position	set "selcet" switch at correct position
	machine inside wire connection not correct	check LED lights if normal to confirm inside wire connection
	machine does not at "AC mode"	set at "AC mode"
load light flashing	at power saver on, load less than 25w	add more loads over 25w , 50w is better until normal
Fan stops run	Fan blocked	check if something block fan, like insect, etc.
	Fan jam	open machine case, find a white probe cable (on cooling fin), let it at short-circuit condition, the small fan should be run (if not,the fan abnormal)
Output short circuit	Load at short circuit	Check load carefully
	Mosfet broken	Check machine inside
Remark: 1kw to 3kw machine, the fan starts to run until temperature reaches 50~60 degree		
4kw to 6kw machine start machine, the big fan starts to run at the same time. the small fan starts to run until the temperature reaches 50~60 degree		

...Need any support,contact our customer servicer freely...

Troubleshooting Guide

Troubleshooting contains information about how to troubleshoot possible error conditions while using the Any Power Combi Inverter & Charger.

The following chart is designed to help you quickly pinpoint the most common inverter failures.

Indicator and Buzzer

Status	Item	Indicator on top cover				Buzzer
		LINE	INVERTER	CHARGE	FAULT	
Line Mode	CC	✓	×	✓	×	—
	CV	✓	×	blink	×	—
	Float	✓	×	blink	✓	—
	Standby	✓	×	×	×	—
Invert Mode	Inverter on (Power saver off)	×	✓	×	×	—
	Power saver on	×	blink	×	×	—
Alarm Mode	Battery Low	×	✓	×	×	beep 0.5s every 5s
	Battery High	×	✓	×	×	beep 0.5s every 1s
	Overload on invert mode	×	✓	×	×	Refer to "Audible alarm"
	OverTemp on invert mode	×	✓	×	×	beep 0.5s every 1s
	OverTemp on line mode	✓	×	✓	×	beep 0.5s every 1s
	Over charge	✓	×	✓	×	beep 0.5s every 1s
Fault Mode	Fan lock	×	×	×	✓	beep continuous
	Battery High	×	×	×	✓	beep continuous
	Inverter mode overload	×	×	×	✓	beep continuous
	OverTemp	×	×	×	✓	beep continuous
	Over charge	×	×	×	✓	beep continuous
	Back Feed Short	×	×	×	✓	beep continuous

Remark: ✓ shows the indicator on. × shows the indicator off. ✓, blink shows the indicator blinking about 0.5s on and 0.5s off.

Table of Contents:

Table Of Contents	1
Figures Of Unit	2
Line Mode Specification	4
Inverter Mode Specification	5
Charge Mode Specification	6
Front Panel	8
Connection Diagram And Installation	13
Troubleshooting Guide	16



Maximum Power Point Tracking (MPPT) function.

Maximum Power Point Tracking, frequently referred to as MPPT, is an electronic system that operates the Photovoltaic (PV) modules in a manner that allows the modules to produce all the power they are capable of. The Solarmate Charge controller is a microprocessor-based system designed to implement the MPPT. And it can increase charge current up to 30% or more compared to traditional charge controllers.

(See figure 1).

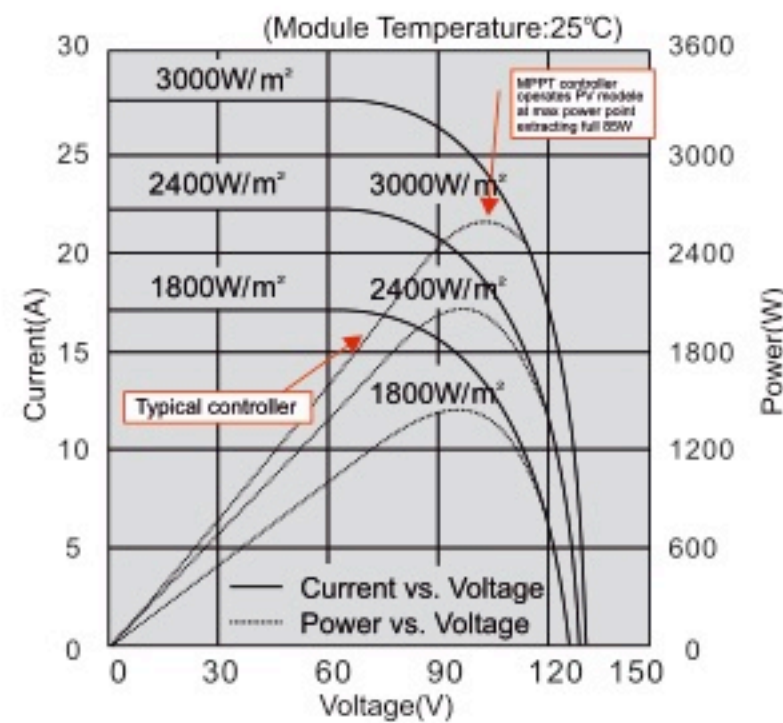


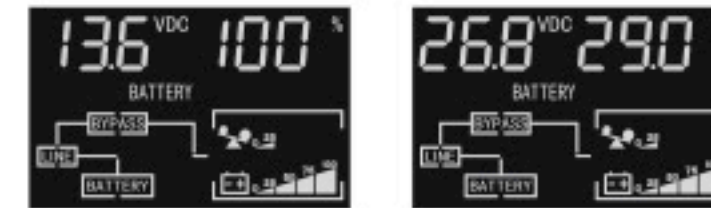
Figure 1 Current, Power vs. Voltage Characteristics

LCD Display



1) Charge Mode

When utility is on, LCD indicate charge current:



2) Utility Mode

On utility mode, the indication and displays are as following figures:



3) Battery Mode

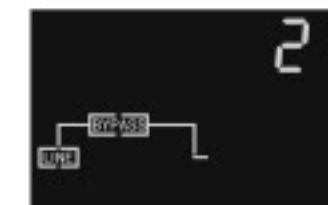
On battery mode, LCD indicate battery capacity:



4) Fault Mode

When inverter fault, the indication and displays are as following figures:

- 1: fan jam
- 2: overload
- 3/6/7: output short circuit
- 4: over temperature
- 8/9: battery overvoltage.



Figures of Unit:

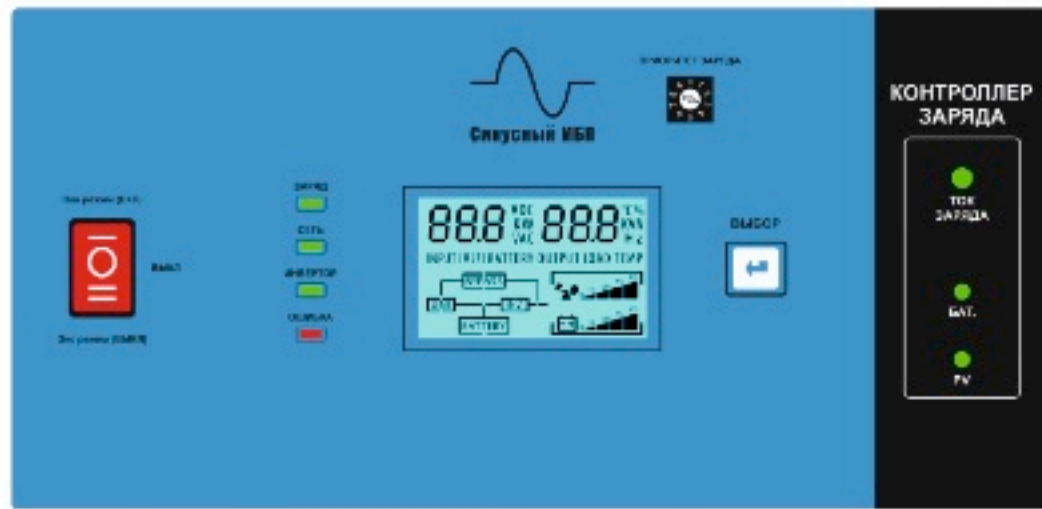
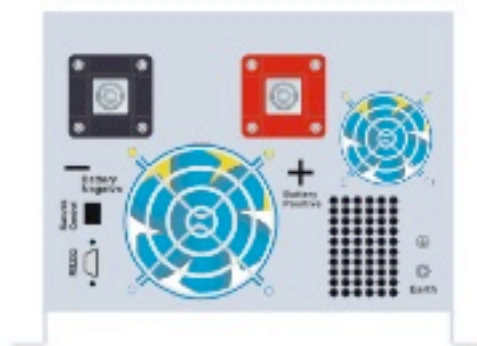


Figure 1 top view



(RS232, Remote control & Optional)

Figure 3 DC side

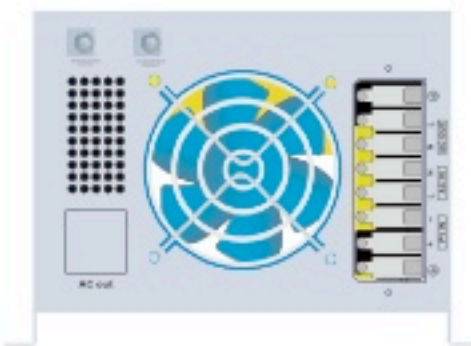
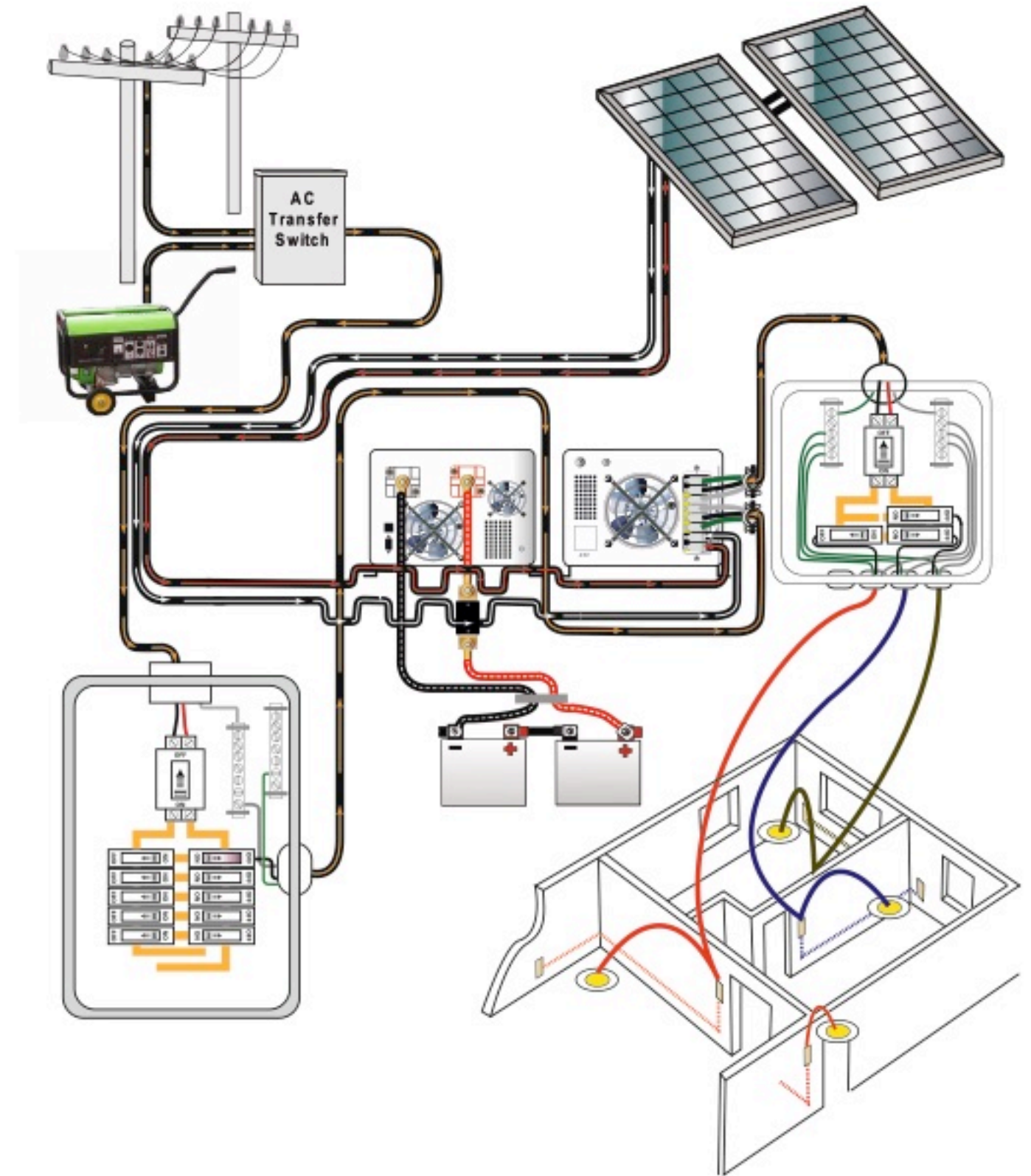


Figure 4 AC side



Remark: Used in utility power or solar system.

Solar Power Inverter

Line Mode Specifications:

MODEL	Model					
	4024	4048	5024	5048	6024	6048
Input Voltage Waveform	Sinusoidal (utility or generator)					
Nominal Input Voltage	230Vac					
Low Line Disconnect	155Vac±2%					
Low Line Re-connect	164Vac ±2%					
High Line Disconnect	272Vac ± 2%					
High Line Re-connect	265Vac ± 2%					
Max AC Input Voltage	270Vrms					
Nominal Input Frequency	50Hz (Auto detection)					
Low Line Frequency Re-connect	44±0.3Hz for 50Hz;					
Low Line Frequency Disconnect	40±0.3Hz for 50Hz;					
High Line Frequency Re-connect	75±0.3Hz for 50Hz;					
High Line Frequency Disconnect	80±0.3Hz for 50Hz;					
Output Voltage Waveform	As same as Input Waveform					
Over-Load Protection (SMPS load)	Circuit breaker					
Output Short Circuit Protection	Circuit breaker					
Efficiency (Line Mode)	>95%					
Transfer Switch Rating	30A					
Transfer Time (Ac to Dc)	10ms (typical)					
Transfer Time (Dc to Ac)	10ms (typical)					
Pass through without Battery	Yes					
Max Bypass Overload Current	30A					

Solar Power Inverter

LED indicator

LED indicator			Messages
ТОК ЗАРЯДА	Green	Solid ON	Charger current between 40A and 60A
		Flashing 1S	Charger current between 20A and 40A
		Flashing 2S	Charger current between 0A and 20A
		Flashing 0.5S	Fault
БАТ.	Green	Solid on	Battery voltage normal
		Flashing 1s	Battery fault is recovering
		Flashing 2s	Battery fault can,t recover
		Solid off	Battery is off
PV	Green	Solid on	PV voltage normal
		Flashing 1s	PV fault is recovering
		Flashing 2s	PV fault can,t recover
		Solid off	PV is off

Type	DC48V/60A
Mppt solar Charge Controller Input	Maximum Open Circuit Voltage of Solar Module 70V ~ 150V
Storage Battery	Nominal Voltage 48V
	Float Voltage 54.8V
	Over Charge Voltage 57.2V
	Lack of Voltage 42.0V
Mppt solar Charge Controller Output	Rated Input Current 60A

Solar Power Inverter

General Specifications

Safety Certification	CE(EN62040-1)
EMC Classification	EN62040-2, C2
Operating Temperature Range	0°C to 40°C
Storage temperature	-15°C ~ 60°C
Operation humidity	5% to 95%
Audible Noise	60dB max
Cooling	Forced air, variable speed fan
Size	1012/1024/2012/2024/2048/3012/3024 : 460x260x185MM

AC Input wiring:

Selecting the proper wire (cable) size is very important for performance and safety. The internal wire resistance varies according to amperage and temperature. It is recommended to keep voltage drop in all circuit under 3%. Below table shows specific cable lengths for the input circuit.

Inverter Model Watts Rating	Nominal Operating DC Voltage	Nominal Operating AC Voltage	AC Breaker size Minimum Wire Size
4024	24Volts	230VAC	20amps-12AWG
4048	48Volts	230VAC	20amps-12AWG
5024	24Volts	230VAC	25amps-10AWG
5048	48Volts	230VAC	25amps-10AWG
6024	24Volts	230VAC	30amps-10AWG
6048	48Volts	230VAC	30amps-10AWG

Solar Power Inverter

Inverter Mode Specifications:

MODEL	Model					
	4024	4048	5024	5048	6024	6048
Output Voltage Waveform	Pure Sine wave					
Rated Output Power (VA)	4000		5000		6000	
Rated Output Power (W)	4000		5000		6000	
Power Factor	1.0					
Nominal Output Voltage (V)	230Vac ±10%					
Nominal Output Frequency (Hz)	50Hz ± 0.3Hz					
Auto tracking Main Frequency (Hz)	Yes (Following Main first connection) 50Hz @40-80Hz					
Output Voltage Regulation	±10% rms					
Nominal Efficiency	>80%					
Over-Load Protection (SMPS load)	(110%<load<125%) ±10%: Fault (shutdown output) after 15 minutes; (125%<load<150%) ±10%: Fault (shutdown output) after 60s; Load>150% ±10%: Fault (shutdown output) after 20s					
Surge rating	12000VA		15000VA		18000VA	
Capable of starting electric motor	2HP		3HP		3HP	
Output Short Circuit Protection	Current limit (Fault after 10s)					
Inverter Breaker Size	30A			30A		
Nominal DC Input Voltage	24V	48V	24V	48V	24V	48V
Min DC start voltage	11V/22V/43V					
Low Battery Alarm	21Vdc±0.6Vdc for 24V battery 42Vdc±1.2Vdc for 48V battery					
Low DC input Shut-down	20Vdc±0.6Vdc for 24V battery 40Vdc±1.2Vdc for 48V battery					
High DC input Alarm & Fault	32Vdc±0.6Vdc for 24V battery 64Vdc±1.2Vdc for 48V battery					
High DC input Recovery	31Vdc±0.6Vdc for 24V battery 62Vdc±1.2Vdc for 48V battery					
Power saver	Load ≅ 25W					

Charge Mode Specifications:						
MODEL	Model					
	4024	4048	5024	5048	6024	6048
Nominal Input Voltage	230Vac					
Input Voltage Range	155~272Vac					
Nominal Output Voltage	Same as input voltage					
MAX Charge Current	65A	35A	75A	40A	75A	50A
Charge Current Regulation	Charge current adjustable: 25%, 50%, 75%, 100%. (Optional)					
Battery initial voltage	20-31.4Vdc/40-62.8Vdc					
Charger Short Circuit Protection	Circuit breaker					
Breaker Size	40A					
Over Charge Protection	Bat. V \geq 31.4/62.8 Vdc , beeps 0.5s every 1s & fault after 60s					
Charge Algorithm						
Algorithm	Three stage: Boost CC (constant current stage) → Boost CV (constant voltage stage) → Float (constant voltage stage)					

Note: When priority selector has 1-6 position (AC priority), the inverter has charger function from AC. When the position is 0 (AC priority), the inverter has no charge function.

AC/Battery Priority:

Our inverter is designed AC priority by default. This means, when AC input is present, the battery will be charged first, For more information, please refer to Charge Stage Transition Definitions on page and the inverter will transfer the input AC to power the load.


When you choose battery priority (position of priority selector is 7-9), the inverter will invert from battery (the load is powered from the battery) despite the AC input. Only when the battery voltage reaches the low voltage alarm point, the inverter will transfer the load to AC input, charge battery from PV and switch back to the battery when the battery is fully charged. This function is mainly for wind/solar systems using utility power as back up.

Fault recovery	By restart the machine			
FAN Operation				
Fan Operation	Variable speed fan operation is required in invert and charge mode. This is to be implemented in such a way as to ensure high reliability and safe unit and component operating temperatures in an operating ambient temperature up to 50°C.			
	<ul style="list-style-type: none"> Speed to be controlled in a smooth manner as a function of internal temperature and/or current. Fan should not start/stop suddenly. Fan should run at minimum speed needed to cool unit. Fan noise level target <60db. 			
	The fan logic as below:			
	Condition	Enter condition	Leave condition	Speed
	HEAT SINK TEMPERATURE	$T \leq 60^{\circ}\text{C}$	$T > 65^{\circ}\text{C}$	OFF
		$65^{\circ}\text{C} \leq T < 85^{\circ}\text{C}$	$T \leq 60^{\circ}\text{C}$ or $T \geq 85^{\circ}\text{C}$	50%
		$T > 85^{\circ}\text{C}$	$T \leq 80^{\circ}\text{C}$	100%
	Charge Current	$I \leq 15\%$	$I \geq 20\%$	OFF
		$20\% < I \leq 50\% \text{Max}$	$I \leq 15\%$ or $I \geq 50\% \text{Max}$	50%
		$I > 50\% \text{Max}$	$I \leq 40\% \text{Max}$	100%
Load% (Invert mode)	Load < 30%	Load \geq 30%	OFF	
	$30\% \leq \text{Load} < 50\%$	Load \leq 20% or Load \geq 50%	50%	
	Load \geq 50%	Load \leq 40%	100%	


Important:

1. Switch positions "0" and "1" are for monthly battery maintenance only. Return the switch to the appropriate position for the system's batteries when Equalize charging has completed. NEVER EQUALIZE GEL BATTERIES! Use together with BATTERYCHARGER RATE potentiometer (position 1) or BATTERY CAPACITY potentiometer (position 0).
2. Equalize voltages are displayed in the table with an asterisk (*) Switch positions "0" and "1" only.
3. Switch position "7" is the default values as shipped from the factory.
4. Always refer to the battery manufacturer's specifications for equalization.

AC Priority (Position of priority selector: 0,1,2,3,4,5,6)

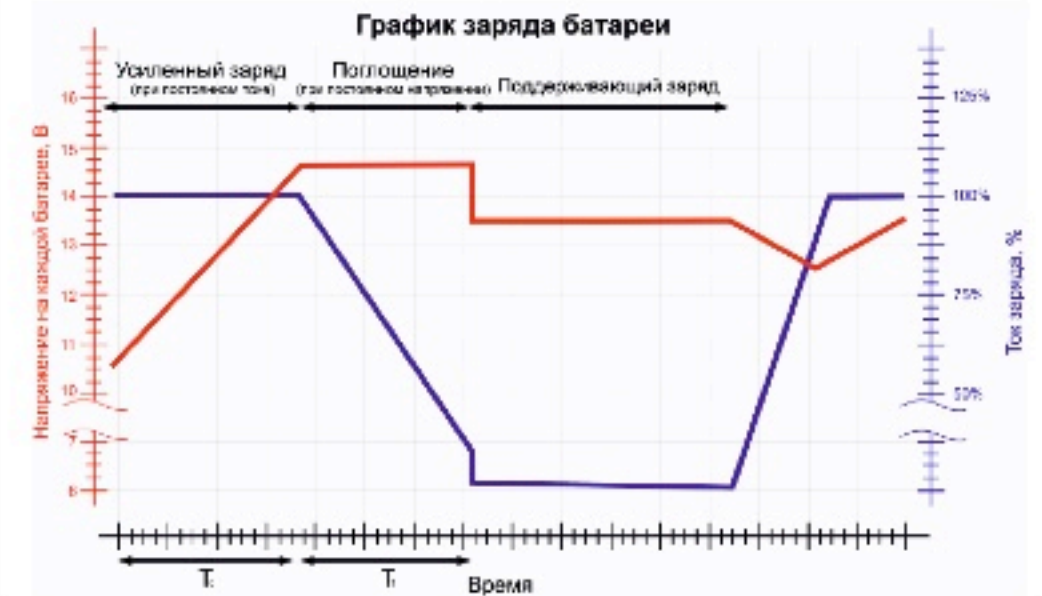
Position of priority selector	Switch setting	Description	Boost		Float	
			Voltage		Voltage	
			24	48	24	48
	0		No charging			
	1	Gel USA	28.0	56.0	27.4	54.4
	2	AGM 1	28.2	56.4	26.8	53.6
	3	AGM 2	29.2	58.4	27.4	54.8
	4	Sealed lead acid	28.8	57.6	27.2	54.4
	5	Gel EURO	28.8	57.6	27.6	55.2
	6	De sulphation	31.0	62.0	4 hours taken off	

Battery Priority (Position of priority selector: 7,8,9)

Position of priority selector	Switch setting	Description	Boost		Float	
			Voltage		Voltage	
			24	48	24	48
	7	Battery prefer mode (boost voltage: 28.2/56.4V, float voltage: 27/54V)	low trip to bypass 22/44V		high trip to bypass 28/56V	
	8		low trip to bypass 21/42V		high trip to bypass 27/54V	
	9		low trip to bypass 20/40V		high trip to bypass 26/52V	








Charge Stage Transition Definitions

- ◆ **Boost CC Stage:** If A/C input is applied, the charger will run at full current in CC mode until the charger reaches the boost voltage.
- ◆ Software timer will measure the time from A/C start until the battery charger reaches 0.3V below the boost voltage, then take this time as T_0 and $T_0 \times 10 = T_1$.
- ◆ **Boost CV Stage:** Start a T_1 timer; the charger will keep the boost voltage in Boost CV mode until the T_1 timer has run out. Then drop the voltage down to the float voltage. The timer has a minimum time of 1 hour and a maximum time of 12 hours.
- ◆ **Float Stage:** In float mode, the voltage will stay at the float voltage.
- ◆ If the A/C is reconnected or the battery voltage drops below 12Vdc/24Vdc, the charger will reset the cycle above.
- ◆ If the charge maintains the float state for 10 days, the charger will reset the cycle.



Front Panel



Switch	Эко режим (ВКЛ)	Power on with saver mode (power saver $\leq 25W$)
	ВЫКЛ	Power totally off (if there is AC power, inverter have charger function)
	Эко режим (ВЫКЛ)	Power on without saver mode
	ТОК ЗАРЯДА	Charging status
	БАТ	Battery voltage status
	PV	PV voltage status
	ЗАРЯД	controller line on
	СЕТЬ	AC power ON
	ИНВЕРТОР	inverter mode
	ОШИБКА	check inverter

Audible Alarm

Battery Voltage Low	Inverter green LED Lighting, and the buzzer beep 0.5s every 5s.
Battery Voltage High	Inverter green LED Lighting, and the buzzer beep 0.5s every 1s, and Fault after 60s.
Inverter Mode Over-Load	110% < load < 125%, no audible alarm in 14 minutes, beeps 0.5s every 1s in 15 th minute, and Fault after 15 minutes. 125% < load < 150%, beeps 0.5s every 1s, and Fault after 60s. Load > 150%, beeps 0.5s every 1s, and Fault after 20s.
Over Temperature	Heat sink temp. $\geq 105^{\circ}C$, Over temp red LED Lighting, beeps 0.5s every 1s;

Protection

Over Temperature Protection	Heat sink temp. $\geq 105^{\circ}C$, Fault (shutdown Output) after 30 seconds
Back-Feed Protection	Yes