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## WATERSECURE™ SYSTEM INTRODUCTION

Thank you for your purchase of a WaterSecure system. This system was designed as an easy to use and setup kit to ensure reliable access to water in both good and bad times. It uses high quality components to deliver years of reliable service.

You have made a wise decision taking control of your water source for good times and bad. Nobody has regretted being too prepared!

With that said, if you would like to discuss this process in more detail, or have other questions, please do reach out to an RPS engineer.

We're a friendly bunch!

# The water secure kit consists of the following main components:

- 1. ALL IN ONE CONTROLLER The state of the art controller features all of the necessary electronics to keep your system operating reliably. The controller takes power from the solar panels to keep the attached batteries charged. When power is needed, it converts the DC power to split phase 110V/220V power to operate your well pump or other electrical loads. It can also optionally take input 220V power from the grid or generator to charge the batteries when there is not enough solar available. Once setup, the controller takes care of the rest!
- 2. SOLAR PANELS The solar panels provide the power for the system to charge the batteries and operate the pump or other load. They are designed of high quality silicon wafers, extruded aluminum frames and impact resistant glass. Panels should be setup in full sun with no shadows and facing South at the appropriate angle based on your latitude. Further details can be found later in this manual.
- **3. BATTERIES** We only use the highest quality sealed lead acid batteries in our system. They are spill proof and maintenance free. Gone are the days of checking acid levels and topping off batteries. If possible, batteries should be located in a room that does not freeze, as low temperatures, below freezing, can temporarily reduce battery capacity.
- **4. ACCESSORIES** We provide all the necessary accessories such as solar panel wire, battery wire and other parts to hook up your system. You simply need to provide any extension wire needed for your solar panels based on their exact mounting location and any wire required to hook up your pump or other load.

## WS-3K SPECS

Maximum Output: 3kW (3000W)

DC Input: 24Vdc AC Output 110Vac:

H1 - N: 110Vac 60Hz, 16A H2 - N: 110Vac 60Hz, 16A

AC Output 220Vac:

H1-H2: 220Vac 60Hz, 16A

**AC Charger:** 

AC Input: 220Vac 60Hz, 22A

**PV Solar Input:** 

Max Amps: 60A Vmp Range: 25-55Vdc Max Voc:

# **WS-3K** SYSTEM OVERVIEW



Warning: Risk of Electric Shock

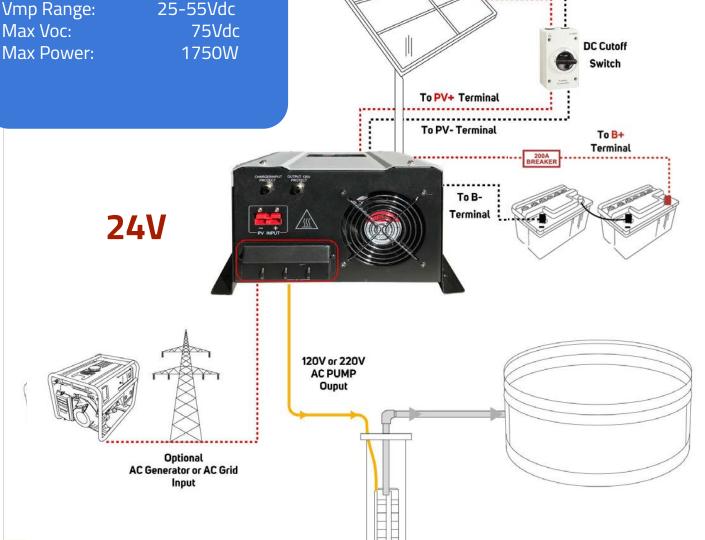
Solar panels and batteries can produce a significant amount of energy, which can cause electric shock.

Whenever you're working with wiring or connections, make sure:

- The DC cut-off switch is in the proper position
- Solar panels are at least partially covered
- There are no exposed wires

Be sure to ground the system for safety and to prevent damage to equipment.

Remember, safety first! RPS is not liable for damage or injuries that result from improper installation technique. If you're unsure about the safety of any step in this manual, please call an RPS Engineer.





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## WS-6K / 12K SPECS

Maximum Output: 6kW /12kW

DC Input: 48Vdc AC Output 110Vac:

H1 - N: 110Vac 60Hz, 30A / 50A

H2 - N: 110Vac 60Hz, 30A / 50A

AC Output 220Vac:

H1-H2: 220Vac 60Hz, 30A / 50A

**AC Charger:** 

AC Input: 220Vac 60Hz, 22A

PV Solar Input:

Max Amps: 60A

Vmp Range: 55-85Vdc

Max Power:

# WS-6K / 12K OVERVIEW



Warning: Risk of Electric Shock

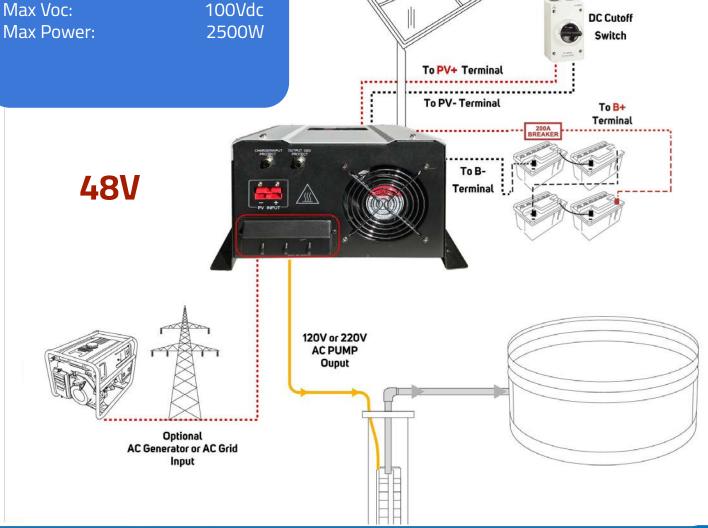
Solar panels and batteries can produce a significant amount of energy, which can cause electric shock.

Whenever you're working with wiring or connections, make sure:

- The DC cut-off switch is in the proper position
- Solar panels are at least partially covered
- There are no exposed wires

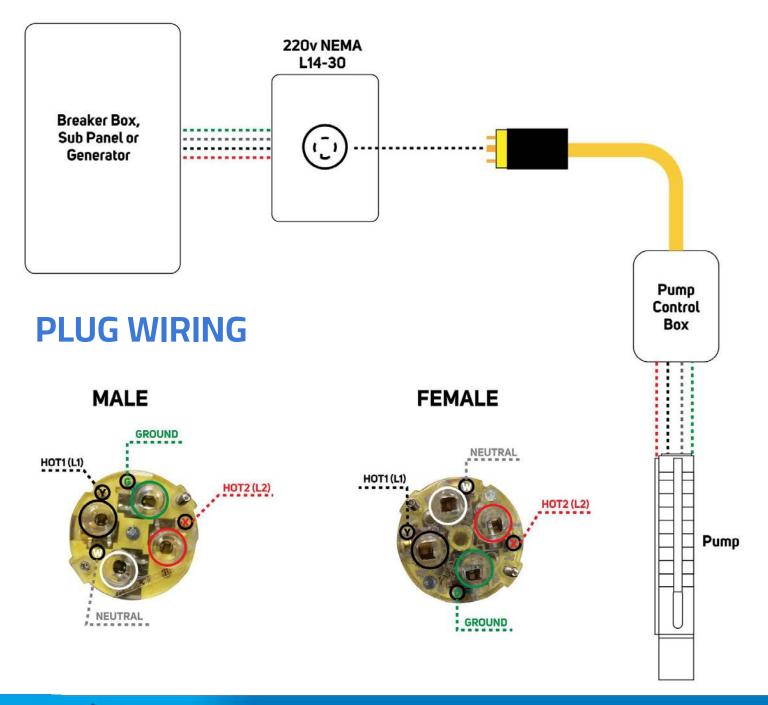
Be sure to ground the system for safety and to prevent damage to equipment.

Remember, safety first! RPS is not liable for damage or injuries that result from improper installation technique. If you're unsure about the safety of any step in this manual, please call an RPS Engineer.



# PRE-INSTALL WIRING OF 220V PLUGS

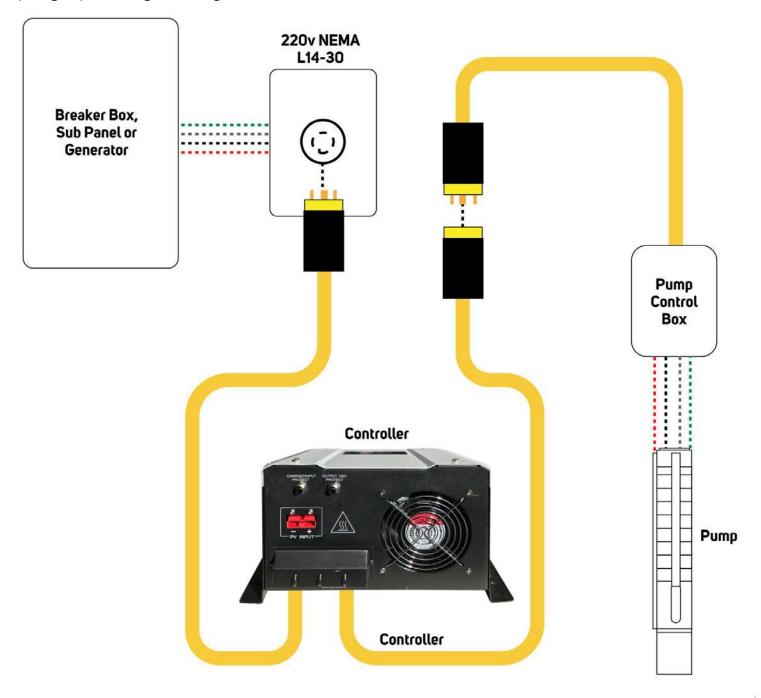
Before your WaterSecure system arrives, have a professional electrician install a FEMALE 220V NEMA L14-30 Plug or junction box to your breaker box, sub panel, or generator and install a MALE NEMA L14-30 plug connected to your pump or pump control box. Once complete you can simply plug your pump into the outlet and operate as usual until your WaterSecure system arrives.





# FINAL INSTALL WATER SECURE SYSTEM

Your WaterSecure system is pre-configured with 2 extension cables with MALE and FEMALE NEMA L14-30 plugs. To install your system, simply unplug your pump from the outlet and connect it to the FEMALE connector coming from the WaterSecure Controller. Then, connect the MALE plug from the WaterSecure controller to the FEMALE outlet or junction box that your electrician installed. It's that simple, you now have reliable 220V AC power even if your grid power or generator goes down.

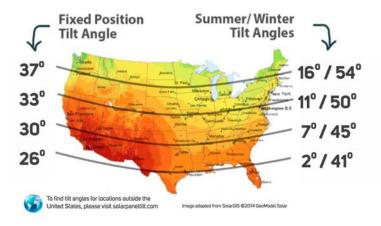


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## **SETUP CONSIDERATIONS**

**SOLAR PANELS** — Solar panels should be mounted on a secure structure, ground mount or top of pole mount. Several ideas can be found at www.RPSSolarPumps.com. Panels should face true South and at an angle appropriate for your latitude. If you are mounting your panels on an already built structure, try to get as close to the correct angle as possible.

Ensure there are no shadows or other obstructions on the solar panels. While shadowing a small corner of a single panel may not seem like a big deal, since the panels are connected in series, a small shadow can limit the power output from all other panels connected in series! This means a small shadow on a single panel could reduce system power by hundreds of watts. Time to get out that chainsaw and trim some trees!



water secure controller — The water secure controller is not waterproof and should be located in a dry location, protected from the elements and pests such as mice and bugs. Mice love to chew wires and spiders will build nests wherever they can find room. While we understand you cannot eliminate all pests, it might be time to spray some insecticides around your shed and set some mousetraps! There is nothing worse than finding insulation chewed off your electrical wires.

Warning: Risk of Electric Shock
Make sure the controller is grounded to either household ground or to a dedicated ground rod.
Grounding of the controller is essential for safe operation.

BATTERIES — Your high quality sealed lead acid batteries are designed for several maintenance free years of operation. They should also be stored in a dry location protected from the elements. To prevent significant voltage drop, the batteries should be located as close to the Water Secure controller as possible. Within 5 feet is ideal. If further than 5ft is required, the wires may be extended using appropriate gauge cables (2 or 0 awg is a good start up to around 10ft or so). The batteries operate best at room temperature and it is best to keep them out of freezing conditions for maximum performance.

LOADS — The system is designed and spec'd to operate your well pump. However, other loads can be connected for lower power pumps. For reliable operation, additional panels and batteries may be required as the load increases. Ensure the total of all loads does not exceed the power output of the controller. Also be cautious of loads with high startup currents such as pumps, motors and refrigerators. The controller can deliver up to 150% of the rated power for 30 seconds, so it is best to keep well under the maximum power output when well pumps and motors are hooked up. The controller will beep every second when in overload.

#### **KEY SETUP POINTS**

- **1. Mount the solar panels facing South** at the angle appropriate for your latitude. Make sure there are no shadows or obstructions on any portion of the panels.
- **2. Mount the Water Secure controller in a dry area.** Try to keep pests away such as mice and bugs. Make sure the controller is securely grounded either to household ground or to a dedicated ground rod.
- **3. Mount batteries in a dry, room temperature area as close to the controller as possible.** They are designed to offer years of maintenance free operation. Try to prevent freezing conditions.
- **4. Do not exceed the maximum output rating of the inverter.** Be careful of loads with high startup currents such as pumps, motors and refrigerators.



## NORTH AMERICAN POWER OVERVIEW

North America operates on what is referred to as "Split phase 110V/220V 60Hz" power.

**Quick note on AC grid power:** The 110V supply can dip as low as 105V and be as high as 120V. Similar for the 220V line, which is between 210V and as high as 240V. For simplicity, these lines are referred to as "110V" and "220V" even though the voltages can vary based on region and overall grid load. All products and electronics are designed to operate safely within these ranges.

The power lines coming into a normal house are as follows:

**HOT 1 (L1): 110V AC HOT 2 (L2): 110V AC** N: Neutral line G: Earth Ground

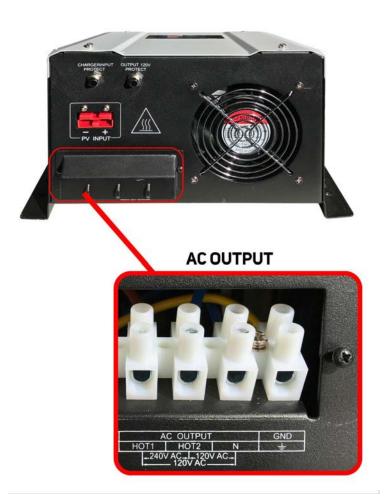
Based on this setup, it is possible to get both 110V and 220V from the same power lines. To get 110V the load is connected between either L1 (or L2) and Neutral. This is the normal everyday wall socket voltage. To get 220V, the load is connected between L1 and L2. The voltage doubles and 220V AC is achieved. (L1 + L2 = 220V). For 220V, the neutral wire is not used.

#### **POWER KEY POINTS**

- 1. North America operates on "Split Phase 220V 60Hz power". Both 110V loads and 220V loads can be connected.
- 2. The Water Secure controller outputs this exact same type of split phase 110V/220V power. Half the total power is available on each 110V line and full power is available on 220V.
- 3. 110V loads should be connected between L1 and N. or L2 and N. Try to balance 110V loads between L1 and L2. 220V should be connected between L1 and L2.

The Water Secure system is one of the only systems that delivers this exact same split phase power. From each of the 110V lines, half the total system power can be drawn. Between the two 110V lines L1 to L2, the total system power can be drawn at 220V! This makes setup and operation easier than ever before. No longer are bulky up or down converters are required for off-grid power.

For 220V loads connect them between L1 and L2 and make sure to connect ground. For 110V loads, connect them between L1 and N or L2 and N and make sure to connect ground. It is best to balance the loads connected to L1 and L2 so a single phase does not get overloaded.





# WS-3K SOLAR OVERVIEW 100W Panels

Connect the panels in parallel and series based on the diagram below and supplied Y-Connectors.

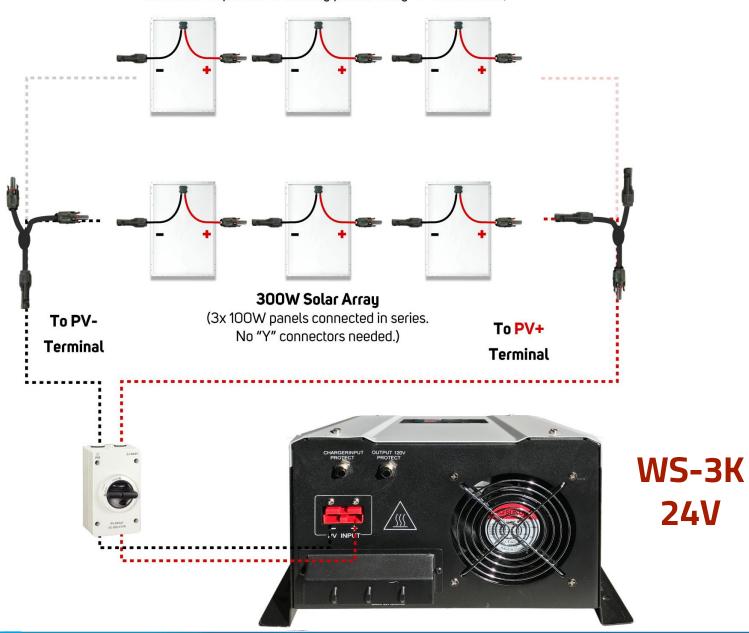
If supplying your own panels:

Make sure Voc input is less than 75V. Over 75V input will damage the controller Extra panel sets should be added in parallel. There must be the same number of panels in each series string. Three panels in series cannot be connected to four panels in series.

**Example:** Connect sets of three "12V" (~18 Vmp) solar panels in Series. Additional sets of panels can be connected in **Parallel** to increase the power of your solar array.

#### 600W Solar Array

(Additional 3x 100W panels connected in series and then connected in parallel to existing panels using "Y" connectors.)



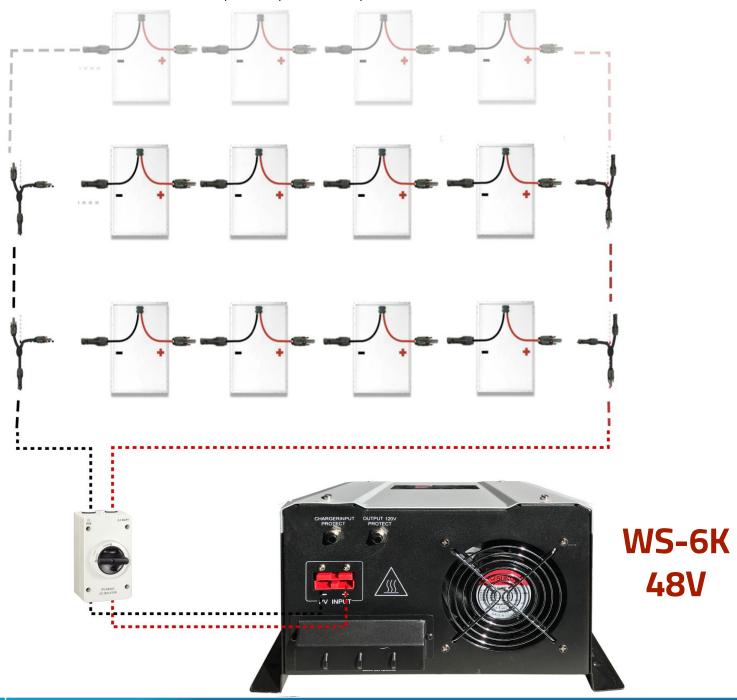


# WS-6K / WS-12K SOLAR OVERVIEW 100W Panels

When using **100W solar panels**, connect the panels in parallel and series based on the diagram below and supplied Y-Connectors when using 100W solar panels. When supplied with larger 300W+ solar panels use the diagram on the following page. If supplying your own panels:

Make sure Voc input is less than 100V. Over 100V input will damage the controller Extra panel sets should be added in parallel. There must be the same number of panels in each series string. Three panels in series cannot be connected to four panels in series.

**Example:** Connect sets of four "12V" (~18 Vmp) solar panels in Series. Additional sets of panels can be connected in **Parallel** to increase the power of your solar array.



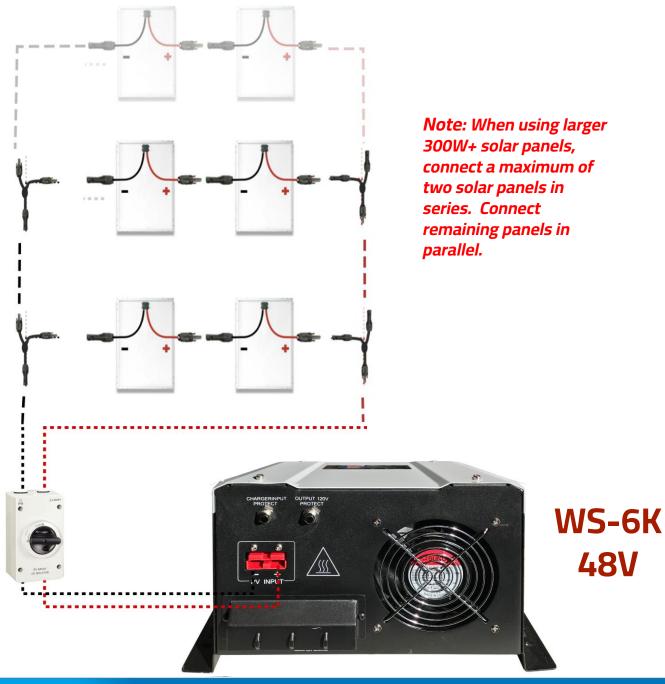
## WS-6K / WS-12K SOLAR OVERVIEW 300W+ Panels

When using **300W+ solar panels**, connect the panels in parallel and series based on the diagram below and supplied Y-Connectors when using 100W solar panels. When supplied with larger 300W+ solar panels only use two panels in series.

If supplying your own panels:

Make sure Voc input is less than 100V. Over 100V input will damage the controller Extra panel sets should be added in parallel. There must be the same number of panels in each series string. Three panels in series cannot be connected to four panels in series.

**Example:** Connect sets of four "12V" (~18 Vmp) solar panels in Series. Additional sets of panels can be connected in **Parallel** to increase the power of your solar array.





## **INSTALLATION MANUAL**

# **WS-3K BATTERY WIRING**

Connect the batteries in parallel and series with the supplied jumpers.

**24V systems**- Two 12V batteries in series, rest in parallel

**Example**: Connect pairs of **12V** batteries in **Series** to output **24V**. Additional pairs of batteries can be connected in **Parallel** to increase the capacity of the battery bank.

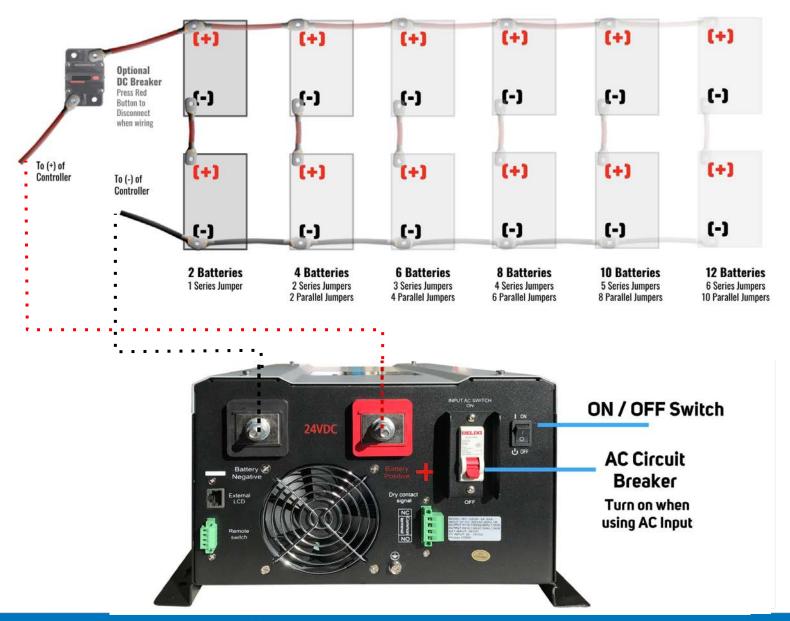
A breaker is placed in-line with the **positive battery lead** going to the **B+ terminal** of the controller and is included with the controller.

Required Battery Connection Wire Gauge = 2 AWG

Max Power = **3000W** 

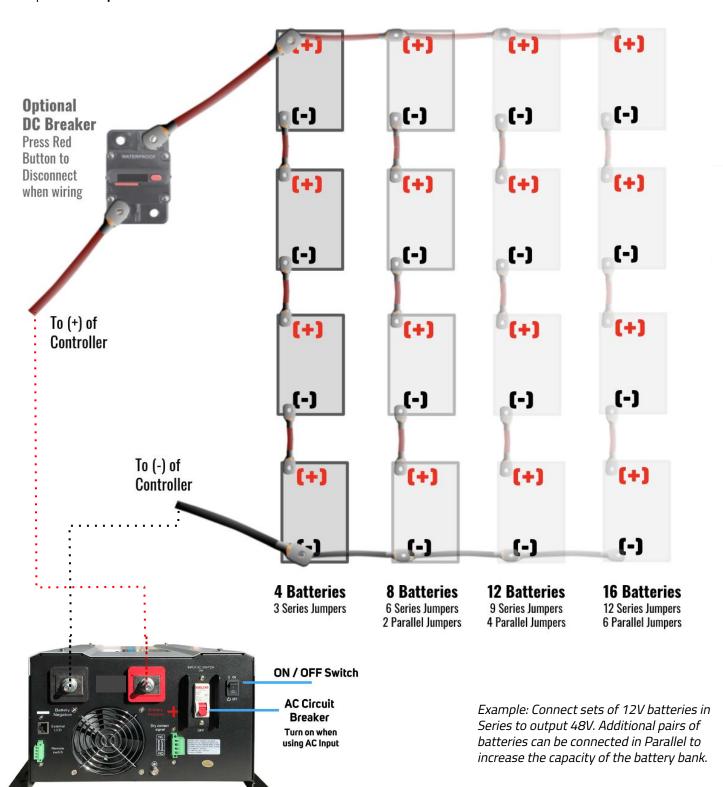
Operating Voltage = 24V

Max Amps = **150 Amps** 



# WS-6K / WS-12K BATTERY WIRING

Connect the batteries in parallel and series with the supplied jumpers. **48V systems**- Four 12V batteries in series, rest in parallel. A breaker is placed in-line with the **positive battery lead** going to the **B+ terminal** of the controller and is included with the controller. Required Battery Connection Wire Gauge = 2 AWG, Max Power = 6000W, Operating Voltage = 48V, Max Amps = **150 Amps** 





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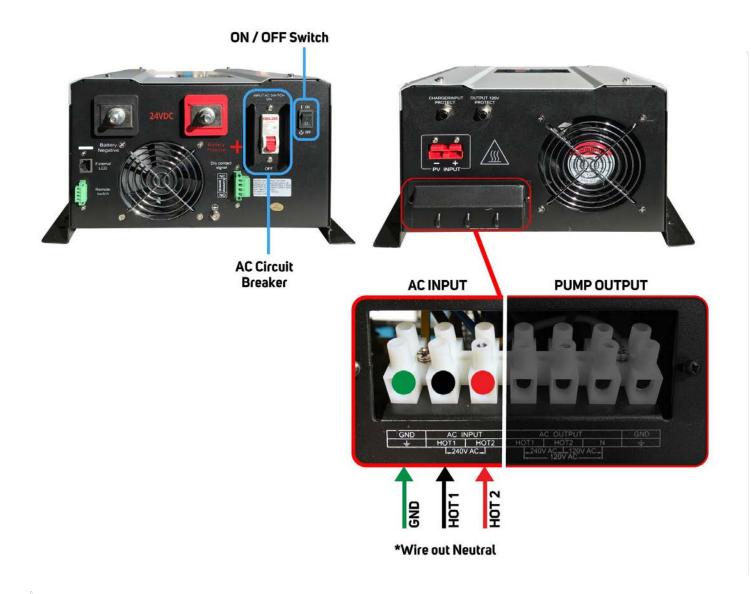
# **AC WIRING**

#### **AC INPUT**

**220V AC** input is optional and can be connected to the input on the terminal strip to assist with battery charging. But beware, **AC** input and **AC** output cannot both be connected to the same grid power. The **AC** input system must be separate from the **AC** output system.

For example, 220V AC can be connected to the controller and 220V output (or 110V) can be connected to a stand alone well pump. When connecting 220V input, turn on the input breaker only after everything is hooked up.

AC input can also be supplied by a 220V generator (sorry 110V input is not supported). Generator should be able to supply at least 3000 watts of power.



## **INSTALLATION MANUAL**

#### **AC OUTPUT**

4

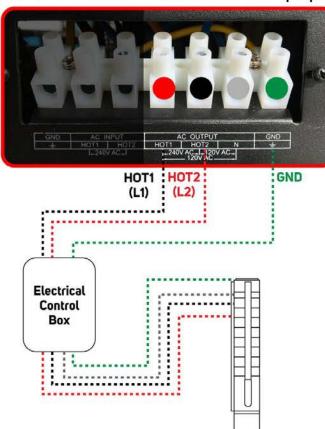
Warning: Risk of Electric Shock When active, the controller will output 220V AC at high power levels that can shock and

kill. Always check to make sure the connections are deactivated before working on them. If you are uncertain of AC connections, contact a professional electrician!

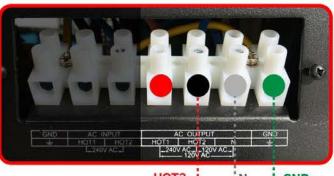
Connect AC loads and pumps to the AC output terminals. 220V loads such has higher power pumps should be connected between L1 and L2 with ground connected.

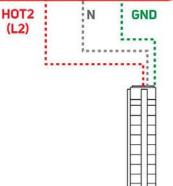
Connected 110V loads from either L1 to N or from L2 to N. Ensure ground is properly connected for loads with a ground. For multiple 110V loads, connect half to L1 and half to L2 to balance the loads. Each 110V line can deliver half the rated power output. It is possible to connect a normal wall socket to either L1 or L2 or both, so normal appliances can be plugged in. When doing this, it is highly recommended to use a GFCI outlet for safety.

#### 220Vac PUMP OUTPUT - With Control Box "3 wire pump"

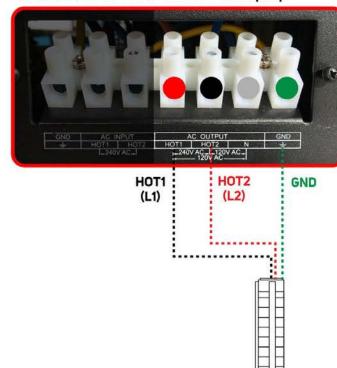


#### 110Vac PUMP OUTPUT - DIRECT





220Vac PUMP OUTPUT - DIRECT "2 wire pump"





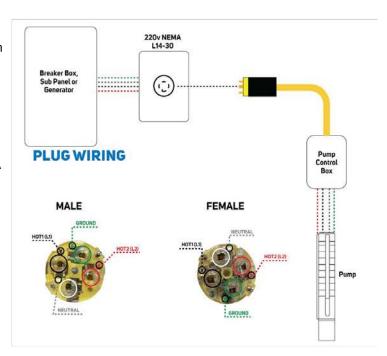
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## **RPS SOLAR PUMPS**

# PRE-INSTALL WIRING OF 220V PLUGS

Before your WaterSecure system arrives, have a professional electrician install a FEMALE 220V

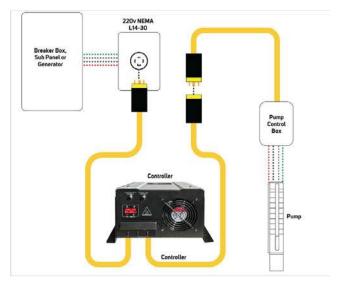
NEMA L14-30 Plug or junction box to your breaker box, sub panel, or generator. Also install a MALE NEMA L14-30 plug connected to your pump or pump control box. Once complete you can simply plug your pump into the outlet and operate as usual until your WaterSecure system arrives.



# FINAL INSTALL WATER SECURE SYSTEM

Your WaterSecure system is pre-configured with 2 extension cables with MALE and FEMALE NEMA L14-30 plugs.

To install your system, simply unplug your pump from the outlet and connect it to the FEMALE connector coming from the WaterSecure Controller. Then, connect the MALE plug from the WaterSecure controller to the FEMALE outlet or junction box that your electrician installed. It's that simple, you now have reliable 220V AC power even if your grid power or generator goes down.



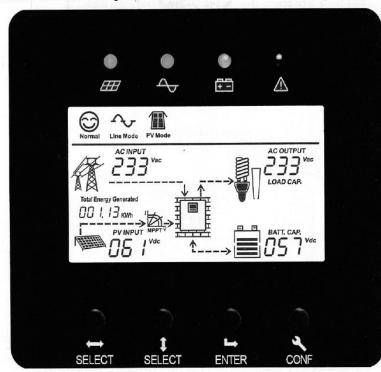
## **FINAL CONNECTIONS**

- **1. SETUP AND MOUNT COMPONENTS** Setup and mount all components based on the considerations outlined previously.
- **2. CONNECT GROUND** Connect earth ground wire to the Water Secure controller. Turn off all power and breaker switches.
- **3. CONNECT AC LOAD** Connect the load to the AC output of the controllers terminal strip. Connect 220V loads from L1 to L2. Connect 110V loads from L1 to N or from L2 to N.
- **4. CONNECT BATTERIES** With the Water Secure controller in the off position, connect the batteries to the controller using the large lugs on the backside of the controller.
- **5. CONNECT AC INPUT (OPTIONAL)** If using AC input, connect the AC input to the input screw terminals. Make sure the AC input breaker on the controller and AC breaker from the grid is turned off (or generator is turned off).
- **6. TURN ON** Once all components are connected, turn on the AC breaker (if using AC input) and turn on the main power switch. Check the status of the controller on the main screen and ensure system is operational.



# **CONTROL PANEL OPERATION**

#### Front Panel and Configuration Switch



LED Indicator			
LED	Description		
PV-LED	GREEN LED Lighting on PV normal		
AC-LED	GREEN LED lighting on AC Line Mode		
Battery-LED	YELLOW LED lighting on Battery Inverter Mode		
Alarm-LED	RED LED lighting on Alarm		

#### Setting Indicators

#### Table 4. configuration option

NO.	Description	Selectable option
1	Input voltage setting	Wide/Normal.
2	Output voltage setting	208/220/230/240Vac.
3	Output frequency setting	50/60Hz/Automatic.
4	AC charge on, off	AC charge on/AC charge off.
5	AC Charger current setting	20A/35A/50A/70A/90A
6	DC/AC/ Intelligent mode selection setting	DC mode priority / AC mode priority, Intelligent mode.
7	DC conversion voltage point setting	11.0Vdc/11.5Vdc/12.0Vdc.

#### Table 3. configuration button function

Switch	Description	
CONF	long press "1S" button to enter the setting interface	
Left right SELECT	Left-right SELECT button can be used for selecting different contents( Voltage, frequency, charging current)	
Up down SELECT	Up – down SELECT button can be used for selecting parameter on the function setting mode	
ENTER	Confirm, data save function	

#### LCD display meaning

#### Table 5. display meaning

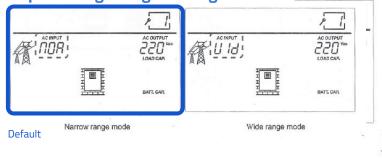
Table 5. display meani	ng			
Normal	Inverter Normal work			
Line Mode	Line Mode is enabled			
PV Mode	PV input is connected			
Batt.Mode	Backup Mode is enabled			
Bypass Mode	Bypass Mode is enabled			
Fault Mode 18	This icon is showed when there is a fault event. The number is the fault code whi can be referred to specific fault event (please refer to Section "Table 6 Fault comeaning").			
#	AC Icon			
BYPASS	Bypass Icon			
888 Hz	AC Voltage and Frequency display			
LOAD CAP. 888 KW	The load icon and level bar indicates the loading level (0~100%), Loading display			
BATT. CAP. Vdc	Level of remaining battery capacity, Battery voltage			
	PV (Solar system)			
PV INPUT	PV (Solar system) input voltage			
Total Energy Generated	DIA CONTROL OF THE PROPERTY OF			
I NPPT V	MPPT solar charger normal working			
	Inverter			







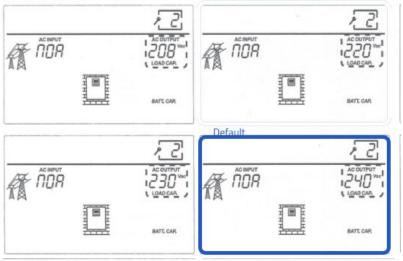
#### 1. Input voltage range Setting



**SETTING #1** adjusts the input range setting selects either wide or narrow input voltage ranges. Default is Narrow (NOA) and recommended.

**NOA**: 210-250VAC **Wd**: 170-280VAC

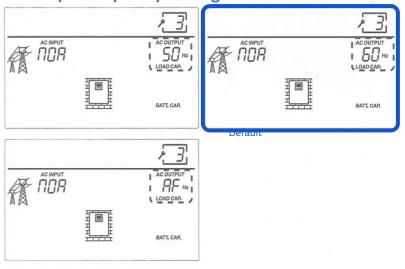
#### 2. Output voltage Setting



**SETTING #2** adjusts the output voltage. Adjust as needed for specific use cases but engineers may recommend using a higher voltage if you have a longer wire run between inverter and pump to lower voltage drop.

208Vac/220Vac/230Vac/240Vac four kinds of output voltage can be set.

### 3. Output frequency Setting



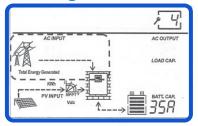
**SETTING #3** adjusts output frequency. Engineers recommend keeping set to 60Hz in the USA. For international customers, check the nameplate on your motor to see if it's 50Hz or 60Hz before adjusting.

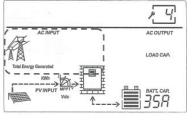
50/60Hz frequency output can be adjusted, as well as the adaptive AC input frequency.

#### \*Default setting marked in BLUE



#### 4. AC charger ON/OFF Setting

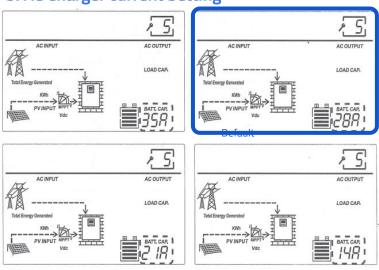




Default

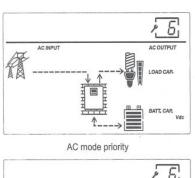
SETTING #4 To supplement solar, WaterSecure is equipped with an 220VAC charger. If AC is hooked up but not desired, you can turn it off here. The dotted lines connecting the power lines and the inverter indicate it's on.

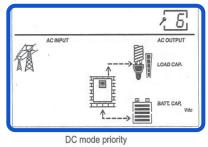
#### 5. AC Charger current Setting

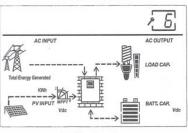


**SETTING #5** adjusts max charging current from Line AC power. If you have a small amp breaker hooked up to the input, you can reduce this setting to lower the amp draw and decrease the rate of charging.

### 6. DC/AC/Intelligent mode selection





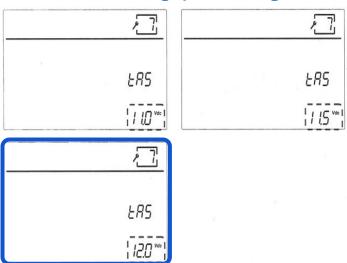


Intelligent mode

**SETTING #6** is the most important of the main settings. Our engineers recommend leaving the unit on the Hybrid setting (arrows from both the Grid in the top left and the Solar Array in the bottom left) If solar is not needed, you can disconnect the solar array or simply turn off the external DC disconnect to the array.

## **RPS SOLAR PUMPS**

#### 7. DC conversion voltage point Setting



DC voltage automatic transfer point setting, 11.0Vdc/11.5Vdc/12.0Vdc three voltages conversion gear.

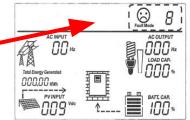
Transfer Setpoint (tAS) sets the battery voltage the system will activate the use of AC Line power to supplement solar charging of the batteries. Ignored if 220v AC not connected.

11.0V Means the system will allow further discharge before using AC power (prioritizing solar)

**12.0V** Means the system will activate the AC charging more quickly keeping batteries topped off

## **FAULT MODE**

The upper right corner of the LCD shows the fault code and buzzer ringing



#### **Operating Indicators**



DC Mode:

Voltage and Frequency exchange every 5 seconds.



AC INPUT

233 Vac

BY

Total Energy Generated

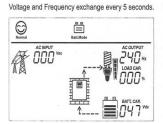
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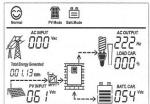
AC+PV Mode:

PV Mode:

Voltage and Frequency exchange every 5 seconds.

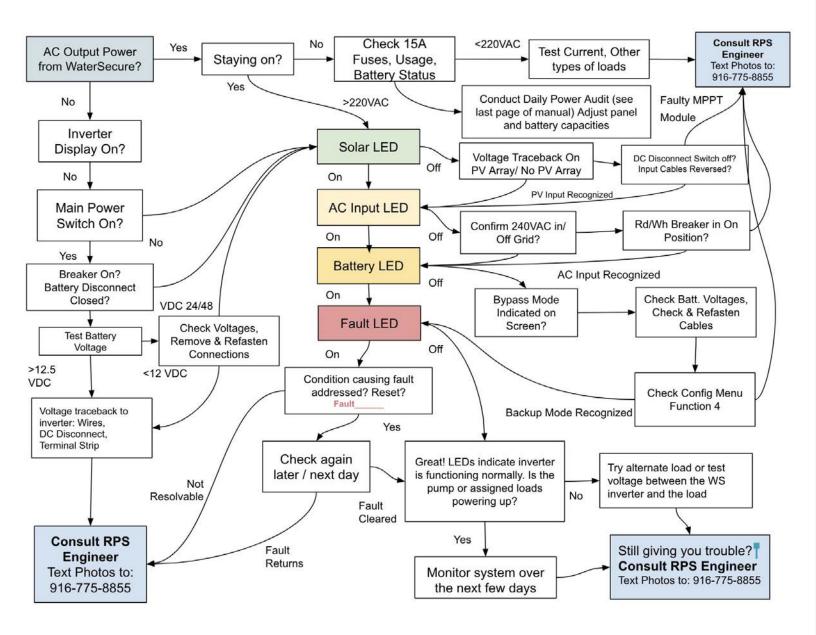
Voltage and Frequency exchange every 5 seconds.





Fault Code	Fault	Reason and Solution		
1	Over Temperature due to Fan Fault	Inverter is overheating, ensure unit has proper ventilation and is not in direct sun. Power down unit and allow time to cool. Check fan operation and replace if fans are not functioning.		
2	General Overload	AC load exceeds the max rated power rating of the unit. Reduce load and restart unit.		
3	Output Short Circuit	Shut off WaterSecure and disconnect all loads. Inspect load equipment for any damage or short circuits. Double check output wiring. Ensure unit is outputting correct voltage using a multimeter.		
4	Over/Under Temperature	Inverter is overheating during operation, ensure unit has proper ventilation. Power down unit to allow time to cool.		
5	Low Battery Voltage	Battery voltage is low and batteries are discharged, allow batteries time to charge via solar or AC power. Ensure all battery jumpers are tight and power off any loads to allow batteries to charge before trying to run unit again.		
6	Power off unit and ensure all input and output wire are properly connected. Double check hot, neutral, and ground wires are connected to the correct terminals.			
7	Semi-Wave Short Circuit	Connected load power spike or unusual load connected. Lower load amount connected and restart unit.		
8	Over Charge	Battery charger error or battery damage present. Consult RPS tech support.		
9	Battery Over Voltage	Battery bank voltage higher then unit specifications. Double check the battery bank voltage matches the required input voltage for your unit. 24V for 3K units and 48V for 6K and 12K units.		

# TROUBLESHOOTING FLOWCHART



## **RPS SOLAR PUMPS**

In some circumstances RPS Engineers may recommend doing a Power Audit to see how much solar power you are generating, storing and consuming. In this case, you can fill out the table below and snapping a photo, and text **916 -775-8855** 

# Power Audit

Day / Time	kWhr Reading On Controller	Battery %	Battery Voltage	Estimated use since last update eg: 20 minutes dishes, shower

Controller uses only 15w to 25w with brushless fan in standby mode.





## Warning: Risk of Electric Shock

Solar panels and batteries can produce a significant amount of energy, which can cause electric shock. Please exercise caution when installing your solar well pump and follow the step-by-step instructions in this manual for your safety.

Whenever you're working with wiring or connections, make sure:

- · the controller is set to OFF
- · solar panels are covered
- there are no exposed wires

Be sure to ground the system for safety and to prevent damage to equipment.

Remember, safety first! RPS is not liable for damage or injuries that result from improper installation technique. If you're unsure about the safety aspects of any step in this manual, please consult an RPS Engineer.

WARRANTY: Rural Power Systems Inc extends to the original consumer purchaser a limited warranty against defects in material and workmanship for a period of twenty-four from the date of purchase. This warranty covers the controller, batteries and solar panels. Rural Power Systems Inc will repair or replace any defective part or parts of the product free of charge within the first twelve months of purchase. In the event of a malfunction, the purchaser must return the product to receive a replacement. The warranty is limited to the repair or replacement of the product. Rural Power Systems Inc. disclaims all liability for indirect and/or consequential damages, such as any installation charges, damage to mounting structures/ buildings, or loss of revenue. The warranty does not apply when the equipment has not been installed according to the instructions or damage has occurred through abuse, carelessness, improper installation, accident of mishandling during shipment, or connecting to an improper voltage. Your warranty is linked to your product's serial number which is on record at Rural Power Systems Inc. All repairs not covered by warranty or outside the warranty period are charged at normal rates.



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> 888-637-4493 Call or Text