



RAYDON Electronics

Portable Energy System

User Manual

Model: PES-A320 / PES-A320N

PES-A160 / PES-A160N

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Your Best Outdoor Power Solution!

Thanks for you to choose **Portable Energy System**. The product is light and portable, developed and designed by innovative technology, fashion and high quality, multiple functions and easy operation.

The product can power small household electrical appliances and digital electronic products indoor. When you camp and have a business trip by car or ship, it can power electrical appliances and digital electronic products of carry-on luggage. It also supports solar charging system. So you can get power anytime and anywhere.

Please read this instruction manual, in order to understand and know well all functions and operation ways of the **Portable Energy System** providing.

When you read this introduction manual or use the **Portable Energy System**, all component name and location for labeling numbers should see Components Figures in **Section 5**.

Portable Energy System will be called “PES” in the following chapters.

Safety Information

Read this instruction manual carefully before using this product.

This instruction manual contains important content. It makes you use this product safe and correctly, and prevent you or others from personal injury and property loss.

Please keep this instruction manual in a safe place, in order to the product's owner can read it anytime.

The meaning of this instruction manual's icons is following:



It is possible to get hurt or damage article, if people don't obey this manual or have a wrong operation.



Important information for helping you use this PES better.

Warning information:



Never put it on near radiator, fan, stove or other water heating equipment and heat sources.



It needs to match with product's specifications for this series product to use power and loading equipment. Otherwise, breaking down system, even damaging system will occur.



Never keep or use gasoline and other flammable products near this product to prevent fire risk from occurring.



Never block up Cooling Fan and Circulation Vent, Keep it in a place with good ventilation when the product is working.



Keep children away from using PES. DO NOT allow children to play with or operate this PES without supervision.




1. Preparation Before Using

- Please to check the PES power before using.
- Please use the Car Charging Cable which be found out on mesh bag of top cover when you need to charge in car.
- Please use the AC Adapter to charge PES when you are indoors and outdoors.
- Please use Solar Panel to charge PES when you are outdoors.

 Solar Panel is not a standard accessory for PES.

2. Accessories

Accessories list:

ID	Accessory	View	Quantity(PCS)	Location
1	Car Charging Cable		1	Mesh Bag in Top Cover. Please see Top Cover Figure in Section 5.2 .
2	DC IN Cable		1	Hop-pocket in Top Cover. Please see Top Cover Figure in Section 5.2 .
3	Adapter		1	In Package.

3. Product Introduction

The PES is power equipment for electronic applications and digital electronic products charge quickly indoor and outdoor.

Nowadays, there are more and more outdoor activities and they are more and more popular, so that people often cannot find some place to charge the outdoor electronic application and digital electronic product when they do outdoor activities and works. However, the PES can solve this problem perfectly.

The PES has a small body and light weight, easy carry and reduces storage place. On the other hand, the PES combines many charging technologies, included car charging output, USB output, DC output, AC output and Option output. So it's not only power almost electronic applications, but also power small household electronic equipment.

4. Product Features

- Rigid water and dust resistant casing design, certified for IP67.
- Ideal outdoor power solution, special for camping, yachting, shipping and outdoor activities.
- Internal battery powers your phone, tablet, laptop, camera, power tool, speaker, camping tools and more.
- Multiple outputs: 5V USB, 12V Car charger, 19V DC, 110V AC. Cover all your portable power requirements.
- Build-in LED lights indicate system status.
- Temperature activated cooling system.
- Supporting DC, AC input, Solar panel input, ideal for outdoor activities (Solar panel not included).
- Selection between 2 different power level systems:
 - 320W: PES-A320(Li-ion); PES-A320N(NiMH)
 - 160W: PES-A160(Li-ion); PES-A160N(NiMH)
- Easy to operate, just press power switch and connect with charging cable.
- Built-in cell balance protection, over current protection, over voltage protection, under voltage protection and short circuits protection.



Flight Safety



Rigid Body: Impact 8J



Water Resistant: IP67



Light Weight



Solar Panel



Safety Protection



Efficient Cooling



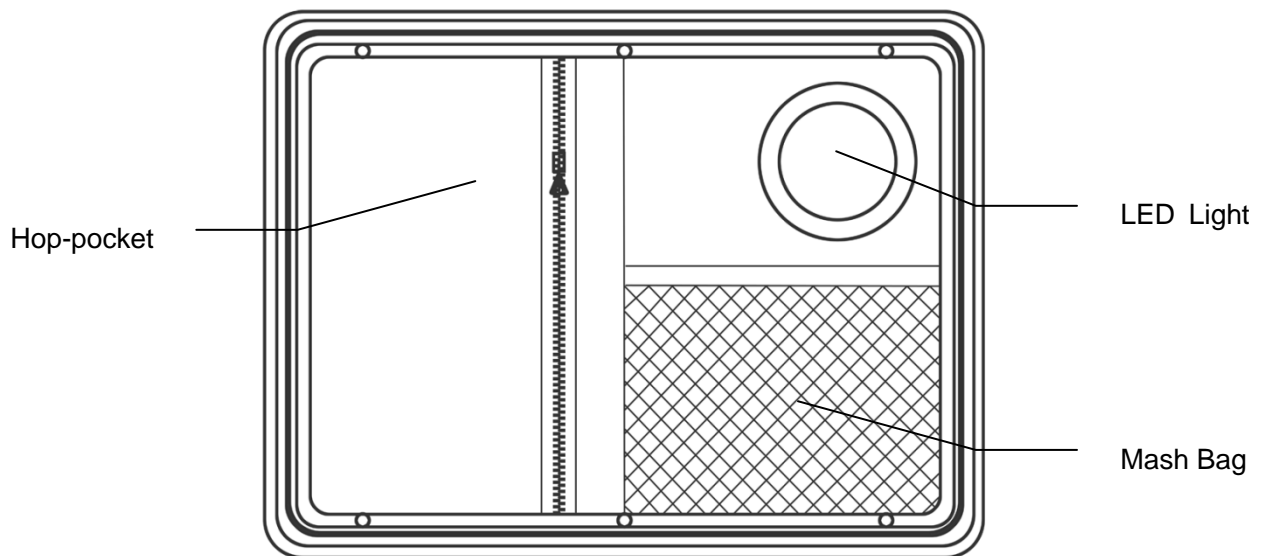
Bright Lighting

5. Components Figures

5.1. Overall Unit Figure



5.2. Top Cover Figure



6. Main Functions

6.1. Top Panel Figure



6.2. Functions List




ID	Port	Function
1	DC/Solar Input	Charging PES, the charging ways: <ul style="list-style-type: none"> ◆ Charging by Adapter. ◆ Charging by car charging. ◆ Charging by solar power (need to purchase solar panel by yourself).
2	Cooling Fan	Cooling the heat for the main power component inner. It will be activated automatically when temperature is too high.
3	DC Output	Charging DC 19V devices.
4	Fuse	Overload protection.
5	USB Output	Charging phone, tablet and more digital electronic product
6	Car Charger Output	Charging by car with Car Charging Cable.
7	AC Output	Charging small household electronic equipment. Please see AC Output Standards in Section 6.2.1 .
8	AC ON/OFF	Power switch for AC Output.

ID	Port	Function
9	Battery Level Display	Display PES capacity, please see Battery Level in Section 6.2.2.
10	ODCP Light	Display operating load status for battery, please see Light Status in Section 6.2.3.
11	UVP Light	Display battery voltage status, please see Light Status in Section 6.2.3.
12	LED Light Switch	Power switch for LED Light.
13	Optional Output	Optional charging, please see Optional Output in Section 6.2.4.
14	DC ON/OFF	Power switch for DC Output.
15	Power ON/OFF	Power switch for PES.
16	Circulation Vent	Dissipating heat.



Please turn on Power ON/OFF before when you using PES.
Please turn on AC ON/OFF before using AC outputs.
Please turn on DC ON/OFF before using DC outputs.
Please turn off Power ON/OFF when not use PES.







6.2.1. AC Output Standards

AC Output Standard		
Standard	Descriptions	Sockets
USA	Output voltage: 110~125V 60HZ.	
Germany	Output voltage: 220~250V50HZ.	
UK	Output voltage: 220~250V50HZ.	



The output voltage must be match with AC Output Standard when you use AC Output to charge device.

6.2.2. Battery Level




ID	Level	View	PES Capacity
1	0 LED		Capacity=0%
2	2 LED		$0% < \text{Capacity} \leq 20\%$
3	4 LED		$20% < \text{Capacity} \leq 40\%$
4	6 LED		$40% < \text{Capacity} \leq 60\%$
5	8 LED		$60% < \text{Capacity} \leq 80\%$
6	10 LED		$80% < \text{Capacity} \leq 100\%$

6.2.3. Light Status

ID	Light	Color	Status
1	ODCP	ON	Output current is exceeding PES's specification.
		OFF	Output current on normal range.
2	UVP	ON	PES works under voltage.
		OFF	PES works in normal voltage.

 Please see Troubleshooting in **Section 8.1** when the ODCP Light or UVP Light ON.

6.2.4. Optional Output

Optional Output		
Name	Descriptions	Applications
Camera Output	Charging camera batteries: ➤ DC Output: DC 4.2V, 8.4V, 12.6V, etc	
Battery Pack Charger	Battery Pack charging, discharging, cell balancing for: ➤ 1~6 cell Li-ion / Li-Polymer / LiFe battery packs ➤ 1~15 cell NiMH / NiCd battery packs ➤ 2~20V Pb battery packs	
Car Starter	Start car with two battery clips: ➤ Output voltage: DC 12V	

7. Waste Disposal



This appliance is identified according to the European guideline 2002/96/EC on waste electrical and electronic equipment - WEEE. The guideline specifies the framework for an EU-wide valid return and re-use of old appliance.

Please dispose of the individual parts separated according to type.

Please ask your dealer or inquire at your local authority about current means of disposal.

8. Appendix

8.1. Troubleshooting

If the PES needs to repair, please check:

1. Please check your device specification, compare with PES's specification.
2. Please see below table when "ODCP" or "UVP" LED ON:

ID	Problem	Cause	Solution
1	ODCP Light ON	Over Discharge Current Protection for output issue.	Please follow below steps: 1. Turn off loading devices. 2. Turn off PES Power ON/OFF. 3. Disconnect loading devices. 4. Please check the device is over load or not.
2	UVP Light ON	PES under voltage.	Charge PES.

8.2. Specifications

	Features	Specifications	PES-A160	PES-A160N	PES-A320	PES-A320N
Input	DC Input	Laptop adapter 15-20V	●	●	●	●
		11V-24V 5A (Max.)	●	●	●	●
	Solar Panel	17.5V/21W (Optional)	○	○	○	○
Output	USB x 2	5V/3.1A (Max.)	●	●	●	●
	DC12V Car Charger	12V/10A	●	●	●	●
	DC 19V Output	19V/3A	●	●	●	●
	AC Output x 2 (AC 220V/50HZ)	0.7A/160W (Max.)	●	●	▪	▪
		1.5A/320W (Max.)	▪	▪	●	●
	AC Output x 2 (AC110V/60HZ)	1.5A/160W (Max.)	●	●	▪	▪
2.9A/320W (Max.)		▪	▪	●	●	
Functional Accessories	LED light	3W	●	●	●	●
	System Status LED	Power ON, ODCP, UVP	●	●	●	●
	Battery Level LED	Multi-Levels LED Display	●	●	●	●
	DC ON/OFF Switch		●	●	●	●
	AC Output Switch		●	●	●	●
	LED Light Switch	L/M/H/ OFF	●	●	●	●
	Cooling Fan	Temperature Activated	●	●	●	●

	Features	Specifications	PES-A160	PES-A160N	PES-A320	PES-A320N
Battery Module	Battery Type	Li-ion/NiMH	Li-ion	NiMH	Li-ion	NiMH
	Capacity(Li-ion)	150Wh/10.4AH; 300Wh/20.8AH				
	Max Power Output(Li-ion)		160W	▪	320W	▪
	Capacity(NiMH)	130Wh/11AH; 260Wh/22AH				
	MaxPower Output(NiMH)		▪	160W	▪	320W
	Built-in Protection Circuit	Cell Balancing, Over Voltage, Under Voltage, Over Current, Short Circuit, Temperature protection	●	●	●	●
Physical Characteristic	Dimensions	L*W*H (cm)	27.0*24.0*18.0		31.5*25.5*19.5	
		L*W*H (in)	10.5*9.5*7.0		12.5*10.0*7.5	
	Weight (Li-ion)	Net Weight (Kg)	4.8	▪	6.2	▪
		Net Weight (Lb)	10.6	▪	13.7	▪
	Weight (NiMH)	Net Weight (Kg)	▪	6	▪	8.5
		Net Weight (Lb)	▪	13.2	▪	18.7
			Symbol: ●: Standard ○: Optional ▪: Not Available			

[The information in this flyer is subjected to change without notice]

8.3. Power Efficiency

Efficiency	
DC Effective:	90%
AC Effective:	80%

Battery Type	Li-ion		NiMH	
Cell Capacity	2600mAh		11000mAh	
Battery Spec.	4S8P	4S4P	10S2P	10S1P
Effective Power	300Wh/20.8AH	150Wh/10.4AH	260Wh/22AH	130Wh/11AH
Power Rating (Wh)	300	150	260	130
Max Power Output	320W max	160W max	320W max	160W max

DC Output	Connection Device	Full Load Run Time (hrs)			
USB	Standard USB 500mA Output	108.0	54.0	93.6	46.8
	Smartphone USB 1.4A Output	38.6	19.3	33.4	16.7
	iPad USB 2.1A Output	25.7	12.9	22.3	11.1
	Max USB 4.0A Output	13.5	6.8	11.7	5.9
12V DC	USB Car charging max output 4.2A	5.4	2.7	4.6	2.3
	Laptop Car charging 11.5V - 16VDC 5.6Amax 60W	4.5	2.3	3.9	2.0
	10.5L Mini car refrigerator 0.36kW/24hrs	18.0	9.0	15.6	7.8
	Surveillance camera DC12V ±10% 7W	38.6	19.3	33.4	16.7
	Car radio station DC13.8V	94.4	47.2	81.8	40.9
LED	5W LED Light	54.0	27.0	46.8	23.4

AC Output	Connection Device	Max Power (W)	Full Load Run Time (hrs)			
Mini electrical equipment	32 inch LED TV	55	4.4	2.2	3.8	1.9
	Blu-ray DVD Player	19	21.8	10.9	18.9	9.5
Camping equipment	Electronic mosquito lamp	15	16.0	8.0	13.9	6.9
Office equipment	Ultra Book: 45W Adaptor	45	5.3	2.7	4.6	2.3
	Medium laptop: 60W Adaptor	60	4.0	2.0	3.5	1.7
	High power laptop: 90W Adaptor	90	2.7	1.3	2.3	1.2
	Desktop PC	200	1.2	X	1.0	X
	Bubble Jet Printer	10	24.0	12.0	20.8	10.4
Power tool	Hand mill	300	0.8	X	0.7	X
	Electric hand drill	300	0.8	X	0.7	X
	Domestic pump (128W, 1.0cube, 12m head)	128	1.9	0.9	1.6	0.8
DC Output		Charge Cycle (times)				
Smart Phone	iPhone	5.5	49.1	24.5	42.5	21.3
	iPad	42.0	6.4	3.2	5.6	2.8
	iPad Mini	16.7	16.2	8.1	14.0	7.0
	iPad Air	32.0	8.4	4.2	7.3	3.7
	3000mAH Phone	11.1	24.3	12.2	21.1	10.5
	10AH Tablet	37.0	7	4	6	3
Input		Fully Charge (hrs)				
Solar Panel	17.5V/21W		14.3	7.1	12.4	6.2
Wall Outlet	110V/220V, 11V-24V 5A max Adaptor		5.7	3.6	4.4	2.2

[Above run time information is based on theoretical calculation, actual running time might be varied according different devices and operation environment.]

8.5. FQA

Q: Can it automatically power off after charging fully devices like phone by this PES? If not, can it damage these devices?

A: PES will automatically interrupt to charge devices after fully charge, so it wouldn't to damage these devices.

Q: Can all phone or digital products charge by this PES?

A: Only the phone or digital products that DC input is 5V can charge by this PES.

Q: How long to charge fully this PES? Could it charge more quickly if use large input current?

A: Theoretically, PES-A320 and PES-A320N need 6 hours to charge fully. PES-160 and PES-A160N need 3 hours to charge fully. Depend on PES design, no matter how large input current, the charging speeds can't be changed.

Q: Can I use this PES by flight or by ship?

A: Only PES-A320N and PES-A160N can use by plane because they using NiMH battery.