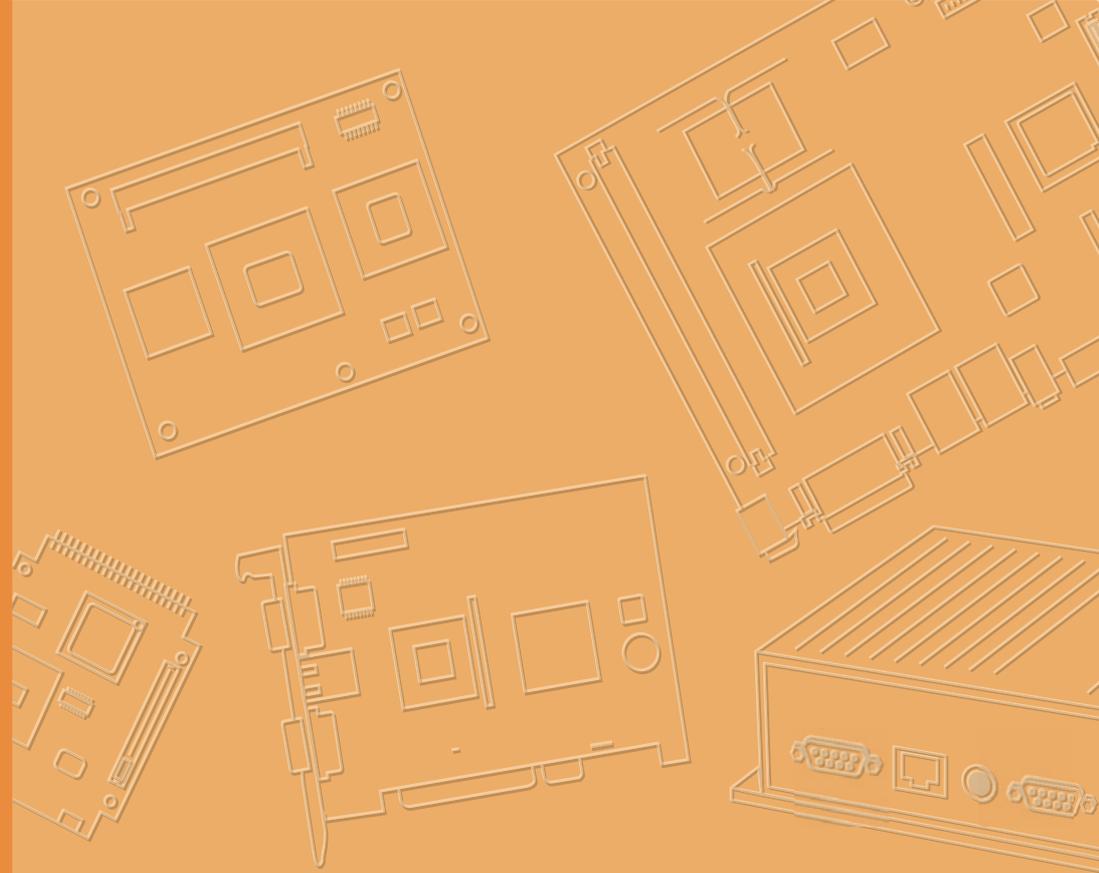


User Manual



Intelligent Power System (iPS)

iPS-M S series Power System

ADVANTECH

Enabling an Intelligent Planet

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Declaration of Conformity

FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Part No. 2008M42010

Printed in Taiwan

Edition 1

July 2014

Technical Support and Assistance

1. Visit the Advantech website at <http://support.advantech.com> where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Any changes or modifications made to the equipment which are not expressly approved by the relevant standards authority could void your authority to operate the equipment.*



Caution! *Danger of explosion if battery is incorrectly replaced.*



Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Note! *Notes provide optional additional information.*



Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- iPS-M series battery system x 1
- 4 PIN Ring Terminal cable x 1
- 4 PIN DC Jack cable x 1
- 6 PIN Remote control cable x 1
- RJ45 - RS232 console cable x 1
- Warranty card x 1

Additional Information and Assistance

1. Visit the Advantech websites at www.advantech.com or www.advantech.com.tw where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages
 - This equipment is a source of electromagnetic waves. Before use, please make sure that there are not EMI sensitive devices in its surrounding which may malfunction therefore

Warning! *To prevent electric shock, turn off AC power or unplug AC power cord before remove cover.*



- Caution!**
1. *Please contact a qualified technician or your retail provider for battery replacement. Do not do it by yourself.*
 2. *There is a danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions*



Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. **DO NOT COVER THE OPENINGS.**
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated into the equipment.
 - The equipment has been exposed to moisture.
 - The equipment does not work well, or you cannot get it to work according to the user's manual.
 - The equipment has been dropped and damaged.

- The equipment has obvious signs of breakage.
- 15. Do not leave this equipment in an environment where the storage temperature may go below -20° C (-4° F) or above 60° C (140° F). This could damage the equipment. The equipment should be in a controlled environment.
- 16. Follow national, state or local requirements to dispose of unit.
- 17. Contact information: No.1, Alley 20, Lane 26, Rueiguang Road Neihu District, Taipei, Taiwan 114, R.O.C. TEL: +886 2-2792-7818
- 18. This equipment shall not be used as a life support system.
- 19. Grounding reliability can only be achieved when the equipment is connected to an equivalent receptacle marked "Hospital Only" or "Hospital Grade".
- 20. Use a power cord that matches the voltage of the power outlet, which has been approved and complies with the safety standard of your particular country.

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Warning! 1. *Input Voltage rate 100-240V~, 47-63Hz, 4.5A Max*



2. *Output Voltage rate*
 System1: 19V , 6A Max
 System2: 12V , 5A Max

Warning! 1. *Do not modify this equipment without authorization of the manufacturer*



2. *To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth*
3. *To prevent electric shock, turn off AC power or unplug AC power cord before remove cover.*
4. *To disconnect this product from the mains supply disconnect the mains plug from the socket outlet. The power supply is regarded as part of this equipment.*

Caution! 1. *Please contact a qualified technician or your retail provider for battery replacement. Do not do it by yourself.*



2. *There is a danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*

Note! *Within the European Union*



EU-wide legislation, as implemented in each Member State, requires that waste electrical and electronic products carrying the mark (left) must be disposed of separately from normal household waste. This includes monitors and electrical accessories, such as signal cables or power cords. When you need to dispose of your display products, please follow the guidance of your local authority, or ask the shop where you purchased the product, or if applicable, follow any agreements made between yourself. The mark on electrical and electronic products only applies to the current European Union Member States.

Explanation of Graphical Symbols



IEC 60878 and ISO 3864-B.3.6 : Warning: dangerous voltage.



ISO 7000-0434: Attention, consult ACCOMPANYING DOCUMENTS.



ISO 7000-1641: Follow operating instructions or Consult instructions for use.



IEC 60417 -5009: SANDY-BY.



IEC 60417-5031: Direct current.

No.	Symbol	Reference	Title
7		IEC 60417-5017	Earth (ground)
8		IEC 60417-5021	Equipotentiality

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Contents

Chapter 1	General Information	1
1.1	Introduction	2
1.2	Specifications	2
1.3	Remote Control Specifications	3
1.4	DC to DC Converter Specifications	3
1.5	Dimensions	4
Chapter 2	Getting Started.....	5
2.1	Overview of IPS-M Power System	6
	Figure 2.1 I/O Ports and AC Connector	6
	Figure 2.2 Front and Top View with AC Switch	6
2.2	Overview of IPS-M Remote Control	7
	Figure 2.3 Remote Control	7
2.3	Battery Charging	7
	Figure 2.4 Connecting the AC power cord with iPS-M battery	7
	Figure 2.5 AC power cord connecting and power switch on.....	7
	Figure 2.6 AC power switch on.....	8
	Figure 2.7 Connecting the remote control	8
	Figure 2.8 Power ON battery	8
2.4	Battery Discharging	9
2.4.1	Device Connection	9
	Figure 2.9 Battery power off	9
	Figure 2.10 Cable connection	10
2.4.2	Discharging Time Estimation	10
2.4.3	Low Capacity Warning	11
2.5	Battery Pack Replacement.....	12
Chapter 3	Battery Maintenance	15
3.1	Regular Use	16
3.2	Storing the Battery	16
3.3	Trouble Shooting	17
Chapter 4	EMC Table	19
4.1	EMC Table	20

Chapter 1

General Information

1.1 Introduction

iPS is an intelligent power system designed to provide DC power to various equipment in a mobile environment. With a Lithium Iron Phosphate (LFP) cell, iPS has a larger battery capacity and lighter weight than traditional battery systems (Lead Acid). Also LFP batteries are more safe, stable, and clean than other types of battery. iPS is suitable to be installed in mobile carts which are used in hospitals and other applications that need higher standard of safety and environmental safety.

1.2 Specifications

Category	Attribute	iPS-M S Series	
		iPS-M420S	iPS-M210S
Power Supply	Battery Type	Lithium-Iron Phosphate	
	Battery Capacity	400Wh	200Wh
	Battery Life SPAN	DOD 80%, 2000 cycles	DOD 80%, 1000 cycles
	Charge Time	< 3hr. DOD 100%	< 1.5hr. DOD 100%
	Input Voltage	100-240Vac, 50-60H, Max 4.5A	
	DC Output Voltage	System 1: 19 Vdc, Max 6A System 2: 12 Vdc, Max 5A	
	Charging Status Indicators	LEDs with continuous readout; intelligent software	
I/O Ports	DC Output Interface	DC Jack (4-pin mini lock din)	
	Communication Interface	RS-232	
Environment	Vibration	5 ~ 500Hz, 1G	
	Cooling System	Fanless	
	Water Resistance	IP67 DC output connector	
Physical Characteristics	Dimensions (L x W x H)	282 x 260 x 101 mm (11.1 x 10.2 x 3.9 inch)	
	Weigh	8 kg	4 kg
	Certifications	UL60601-1/EN60601-1, CE, FCC Class B, CCC certified	
Power Manager Software	AMiS_Link	Battery capacity indicator	
		Alerts (battery capacity, temperature, warning)	
		Battery Life cycle statistics	
		Report & log file	
		Client Installation Server Installation (Optional)	
		Multi-language support, including Chinese Traditional, Chinese Simple, English, German and Dutch	

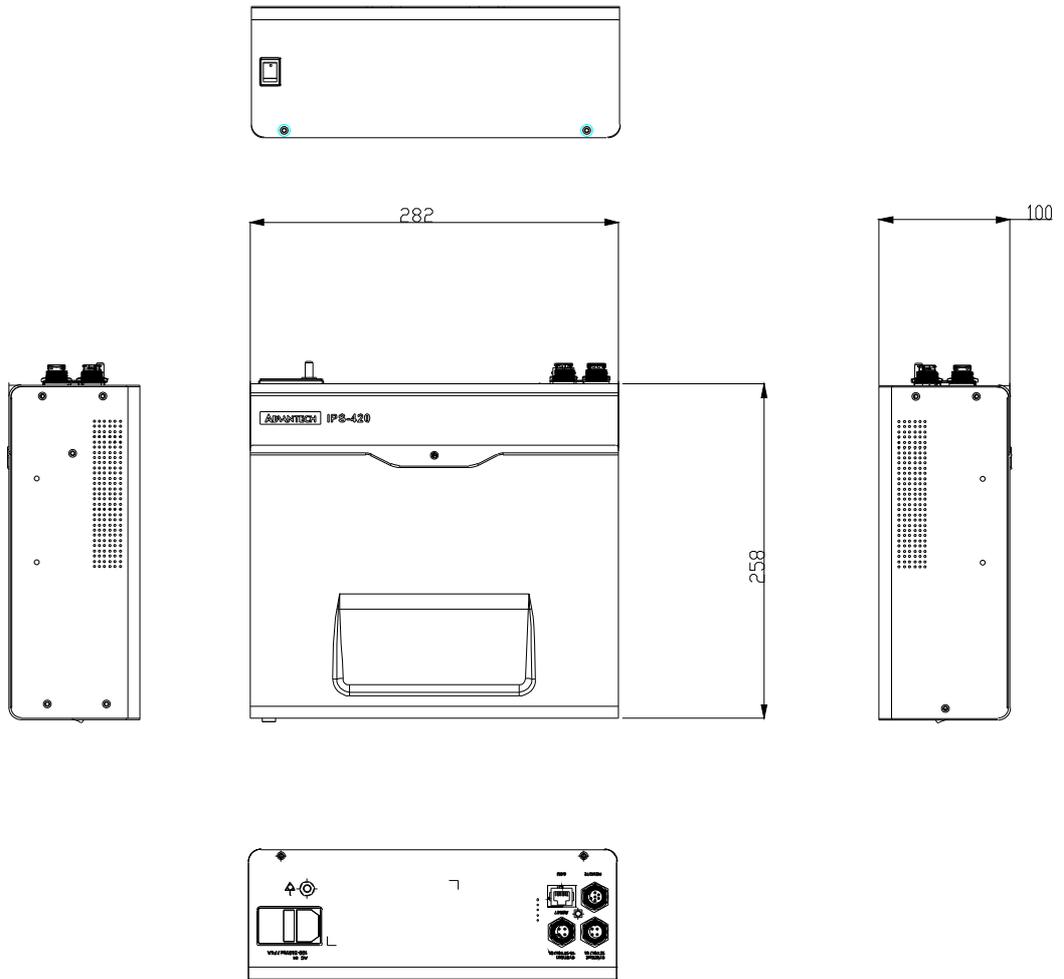
1.3 Remote Control Specifications

Category	Attribute	iPS-REMT
Physical Characteristics	Dimensions (L x W x H)	80 x 48 x 14 mm (3.1 x 1.8 x 0.5 inch)
	Weight	0.3kg
Display & Controller	Power Button	Battery power button
	LED Display	LED Indicator

1.4 DC to DC Converter Specifications

Category	Attribute	iPS-REMT
Physical Characteristics	Dimensions (L x W x H)	54 x 23 x 12 mm (2.1 x 0.9 x 0.4 inch)
	Weight	0.4kg
I/O ports	DC-In	12-24Vdc, 8-3A
	DC-Out	Mode 1: 12Vdc, 6A Mode 2: 15Vdc, 5A Mode 3: 16Vdc, 5A Mode 4: 19Vdc, 4A

1.5 Dimensions



Chapter 2

Getting Started

2.1 Overview of IPS-M Power System

Before starting to use IPS, take a moment to become familiar with the functions of connectors, switches, and ports, which are illustrated in the figures below.



- 1. System 2: 12 V_{DC}, 5 A
- 2. System 1: 19 V_{DC}, 6 A
- 3. 6-pin remote control connector
- 4. RJ-45 (to RS-232) connector

- 5. AC In and AC On/Off switch
100 ~ 240 V_{AC} / F4A
- 6. AC input switch
- 7. Ground pole

Figure 2.1 I/O Ports and AC Connector

The front side view, figure 2.2



Figure 2.2 Front and Top View with AC Switch

2.2 Overview of IPS-M Remote Control

Remote control is a switch for IPS. There is one Power On/Off button and LED indicator to display battery capacity. See figure 2-4 for button and LED indicator.



Figure 2.3 Remote Control

2.3 Battery Charging

When purchasing the iPS-M Power System, you MUST perform a battery charge before providing power to other devices.

To do a battery charge, connect the AC power cord and turn on the AC power switch beside the AC-IN connector on the front side. Also, connect the remote control to the battery and press the power on button (press and hold for at least 7 seconds) to turn on power.

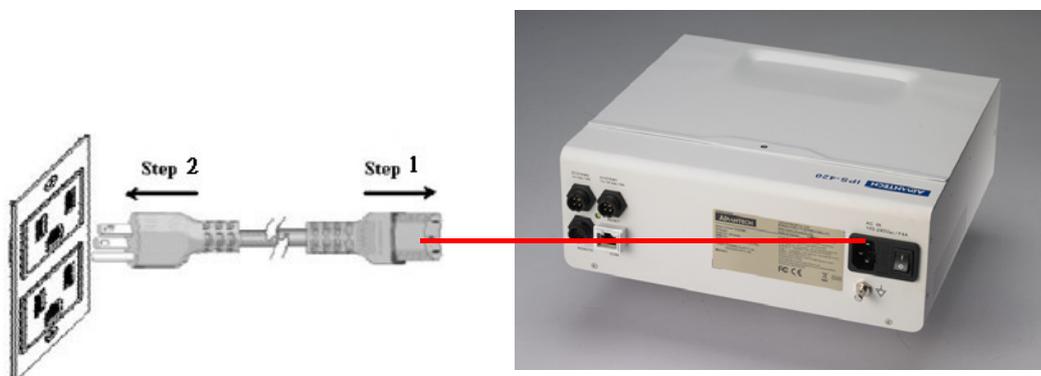


Figure 2.4 Connecting the AC power cord with iPS-M battery



Figure 2.5 AC power cord connecting and power switch on

Turn on switch



Figure 2.6 AC power switch on

Connect remote control



Figure 2.7 Connecting the remote control

Press the power button and hold for 7 seconds to turn on battery power

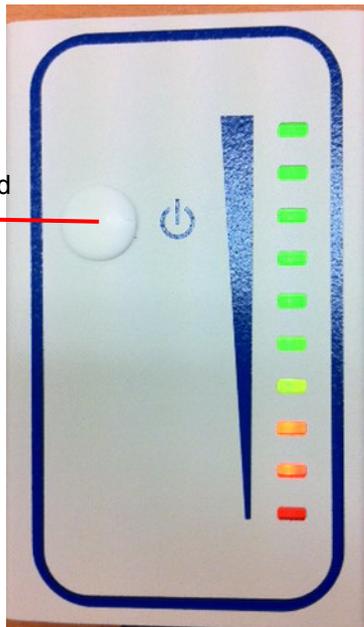


Figure 2.8 Power ON battery

When the battery is charging an LED indicator keeping flashing. If the battery capacity reaches 100%, the LED indicator stops flashing and all LEDs are bright.

Caution! After purchasing the new iPS-M power system, you must charge the battery to 100%, which keeps the battery cell in active status and extends battery life.



Caution! When charged to 100%, its best to remove AC power to prevent OVER CHARGING which may decrease battery life.



2.4 Battery Discharging

iPS-M power system provides 2 output modes to provide power to loader (PC or other devices). DC power can provide from one of each DC output port or both ports.

Max Watt for System 1 and System 2 output:

System 1: $19V \times 6A = 114W$

System 2: $12V \times 5A = 60W$

Maximum output is around 174W.

2.4.1 Device Connection

Before connecting equipment to iPS-M power system, turn off battery power from the remote control first. Then connect the cable to the battery system and equipment.

Press power button and hold for 7 seconds to turn off battery power. When power is off, all LED light will go off.

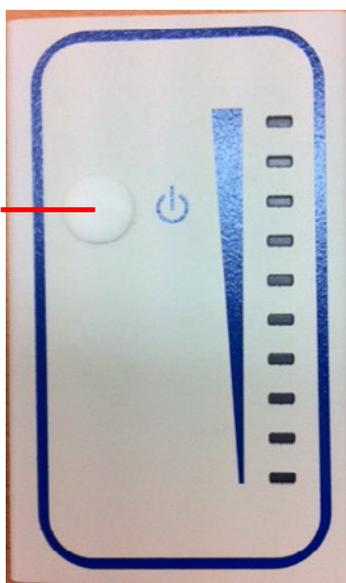


Figure 2.9 Battery power off

Connecting iPS-M cable to System 1 or System 2 port, depends on equipment voltage definitions.

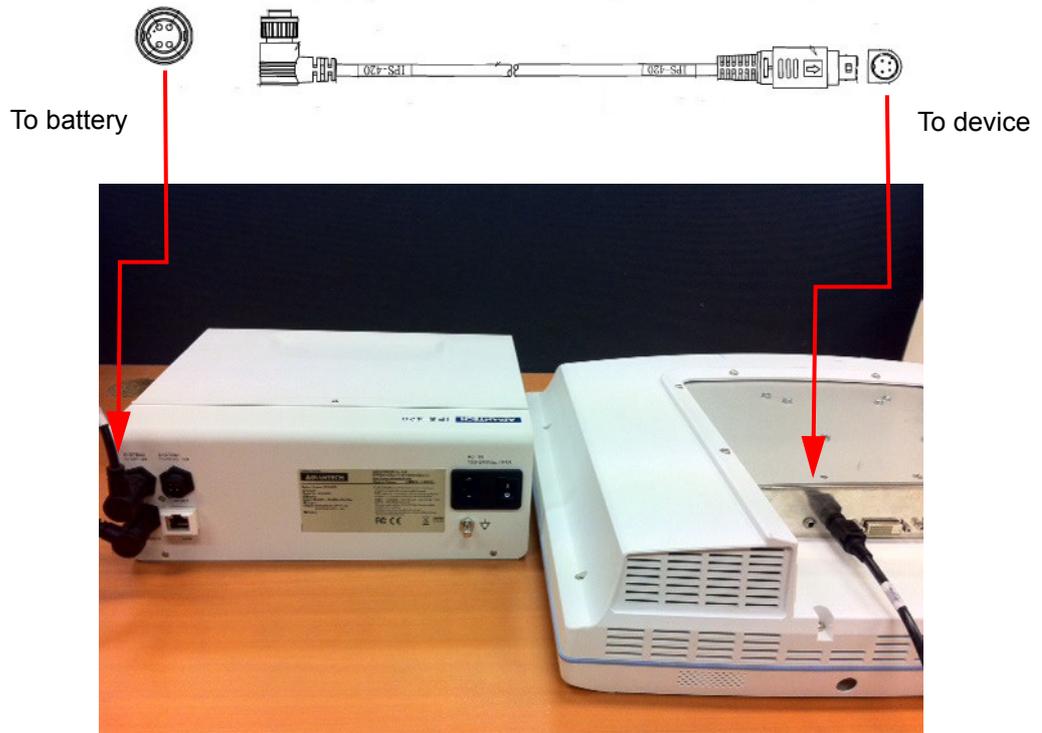


Figure 2.10 Cable connection

After all cables are well connected, turn on the battery power by pressing the power button (hold for 7 seconds) on the remote control again and the battery is ready to supply DC power to device.

2.4.2 Discharging Time Estimation

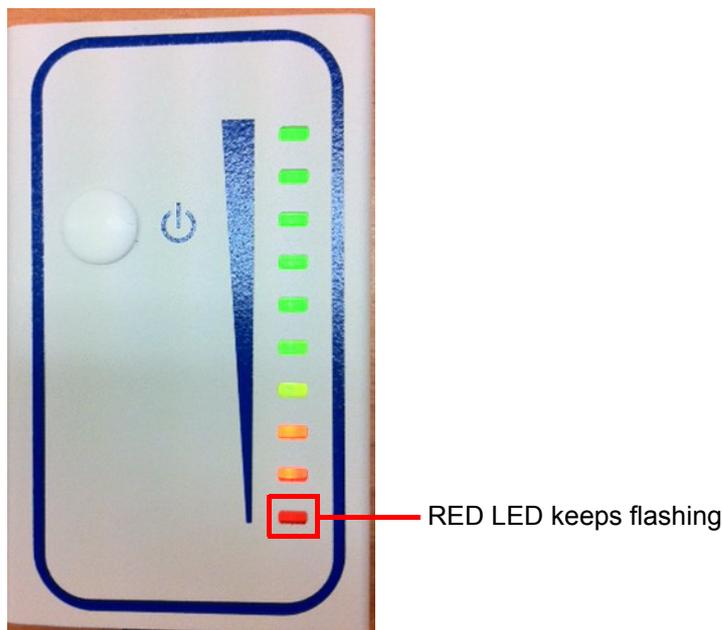
To estimate discharging time, you must need to know the power consumption of the loader (PC or Device). For example, assuming power consumption of the loader is 40Wh, discharging time for different capacities of iPS-M batteries is listed following:

Model	Discharging Time Estimation
iPS-M420S	8 ~10 hours (400Wh / 40 Wh)
iPS-M210S	4~ 5 hours (200Wh / 40Wh)

2.4.3 Low Capacity Warning

When the battery capacity is lower than 10%, battery protection will be active to prevent battery over discharging. There are 2 scenarios:

1. *When the battery level is lower than 10% during continuous use:*
The Red LED keeps flashing and a warning beep sound is triggered. The beeping sound will continue until the AC power is plugged in. When battery capacity is 0%, the battery system shuts down automatically.
2. *Turning iPS on when battery capacity is lower than 10%:*
If the battery capacity is less than 10% initially, when you press the power on button on the remote control to turn on the battery, the Red LED on the remote will keep flashing and a warning beep sound is triggered. The beeping sound will continue until AC power is plugged in. When battery capacity is 0%, the battery system shuts down automatically.



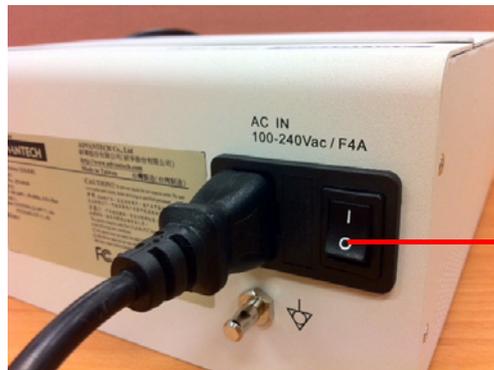
Warning! *When the battery capacity is 0%, you MUST RECHARGE WITHIN 48 HOURS to keep the battery cell alive and extend the battery life.*



2.5 Battery Pack Replacement

iPS-M power system allows to do battery pack replacement in just 4 easy steps.

1. Turn AC power switch off.

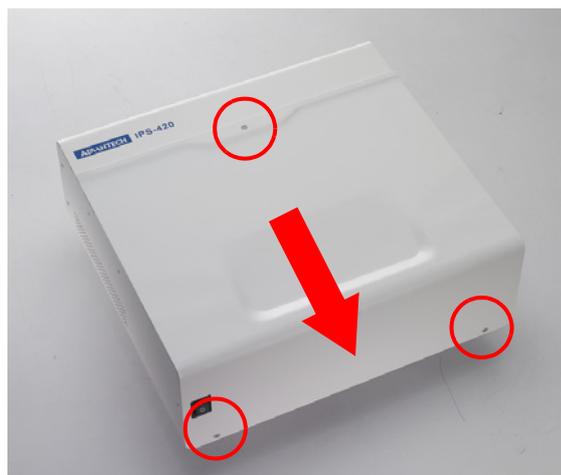


Turn off switch



Turn off switch

2. Remove top cover screws and top cover.



3. Remove screws on battery pack holder.



4. Disconnect battery cell cable and system cable to remove old battery cell and replace new one.



5. Reverse above steps to reassemble the battery system.

Chapter 3

Battery Maintenance

3.1 Regular Use

There are 3 key points you need to know when maintaining the battery system:

1. When the battery is new, immediately recharge it to 100% before first use.
2. When power capacity is lower than 30%, and the LED indicator appears orange, plug the AC power to recharge.
3. If battery is over-discharged, and the PC or connected devices are shut down or powered down. The battery must be recharged within 48 hours (2 days) to maintain the battery life.

3.2 Storing the Battery

If the battery system or battery pack is going to be stored in a warehouse for a long time, the following tasks need to be performed:

1. When battery is new, recharge it to 100% immediately, before moving to the warehouse.
2. Before storing the battery and leaving it in idle status, it must be recharged to 100%.
3. If battery is not to be used or put in idle mode for a long time, recharge to 100% than move to the warehouse. It is also suggested to perform a recharge regularly:
For 400Wh power system: every 1 year
For 200Wh power: every 6 months

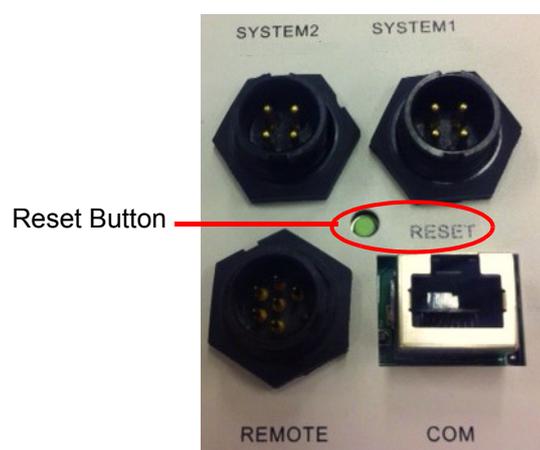
3.3 Trouble Shooting

When the battery system runs abnormally, such as:

1. Failure to power on
2. Failure to power off
3. Remote LED ON but no DC power output
4. AC power in and all switches ON, but the battery doesn't recharge

There is a reset button on battery system, follow these recovery steps:

1. Press the reset button once (when battery power is down: remote LED off)
2. Press power button (hold for 7 seconds) on Remote Control to power on the battery
3. When the LED lights up again, the battery system is recovered.



Warning! *When battery is going to be stored for a long time, make sure to recharge it to 100% capacity. If stored in a warehouse over 1 year, you need to do regular recharges:*



Every year for 400Wh power system

Every 6 months for 200Wh power system

Chapter 4

EMC Table

4.1 EMC Table

Guidance and manufacturer's declaration – electromagnetic emissions		
The model IPS-M power system is intended for use in the electromagnetic environments specified below. The customer or the user of the model IPS-M power system should be assured that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment – guidance
Conducted Radiated EN 60601-1-2		The model IPS-M is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2		
Voltage fluctuations & flicker emissions IEC 61000-3-3		

Guidance and manufacturer's declaration – electromagnetic immunity			
The model IPS-M power system is intended for use in the electromagnetic environment specified below. The customer or the user of the model IPS-M power system should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV line(s) to line(s) ±2 kV line(s) to earth	±1 kV line(s) to line(s) ±2 kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % UT (>95 % dip in UT) for 0,5 cycle	<5 % UT (>95 % dip in UT) for 0,5 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of the model IPS-M Bat- tery requires continued operation during power mains interruptions, it is recommended that the model IPS-M Battery be powered from an uninterr- ruptible power supply or another battery.
	40 % UT (60 % dip in UT) for 5 cycles	40 % UT (60 % dip in UT) for 5 cycles	
	70 % UT (30 % dip in UT) for 25 cycles	70 % UT (30 % dip in UT) for 25 cycles	
	<5 % UT (>95 % dip in UT) for 5 sec	<5 % UT (>95 % dip in UT) for 5 sec	
NOTE <i>UT</i> is the a.c. mains voltage prior to application of the test level.			

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