

SANUPS

ON LINE UPS

A11J

TYPE S2 5, 10, 15, 20 kVA

Instruction Manual

SANYO DENKI

Introduction

Thank you for choosing the SANUPS A11J.

SAVE THESE INSTRUCTIONS

This manual contains important instructions for A11J that should be followed during installation and maintenance of the UPS*¹ and batteries to protect the safety of the customer and the service technician*². To use the UPS correctly and safely, read this manual before using the UPS. For details on the functions and operation of the LCD panel, see the separate *LCD Panel Operating Manual*. After reading, please keep this manual handy for convenient reference together with the *LCD Panel Operating Manual*.

This UPS is intended for installation in a temperature-controlled indoor environment free of conductive contaminants.

- Operating temperature: 0 to 40°C (32 to 104°F)

*¹ UPS is an abbreviation for Uninterruptible Power Supply.

Table of Contents

§1. Before Use	1
§2. Safety Precautions	2
§3. For Proper Operation	6
§3.1 UPS Input Power Supply	6
§3.2 Installation Precautions	6
§3.3 Usage Precautions	7
§4. Checking Contents of Package	8
§5. External Dimensions and Part Names	9
§5.1 UPS	9
§5.2 LCD Panel	10
§5.3 UPS Unit Control Panel	11
§5.4 External Interfaces	12
§6. Installation and Wiring	15
§6.1. Check Before Installation	15
§6.1.1 Checking Installation Environment	15
§6.1.2 Checking Installation Space	15
§6.2 Installing UPS	16
§6.3 Connection Between Units	17
§6.4 Wiring Inputs/Outputs	19
§6.5 Connecting Optional Equipment	21

*² Service technician

This term is used to indicate service technicians from SANYO DENKI or entrusted from SANYO DENKI with knowledge of this UPS.

Maintenance work must not be performed by other than a qualified service technician.

Notes about UPS Model

This manual is for the following UPS Models. Confirm your UPS Model before using the UPS.
When using a UPS with long backup times, for details on the extension battery, see the supplied instruction manual with the extension battery.

Capacity	Type	UL Model	UPS Name*
5 kVA	A11J502SA002U	A11J502US002	A11J502
10 kVA	A11J103SA002U	A11J103US002	A11J103
15 kVA	A11J153SA002U	A11J153US002	A11J153
20 kVA	A11J203SA002U	A11J203US002	A11J203

* In this instruction manual, the UPS Names may be referred to as "A11J***" as shown in the table above depending on the item explained.

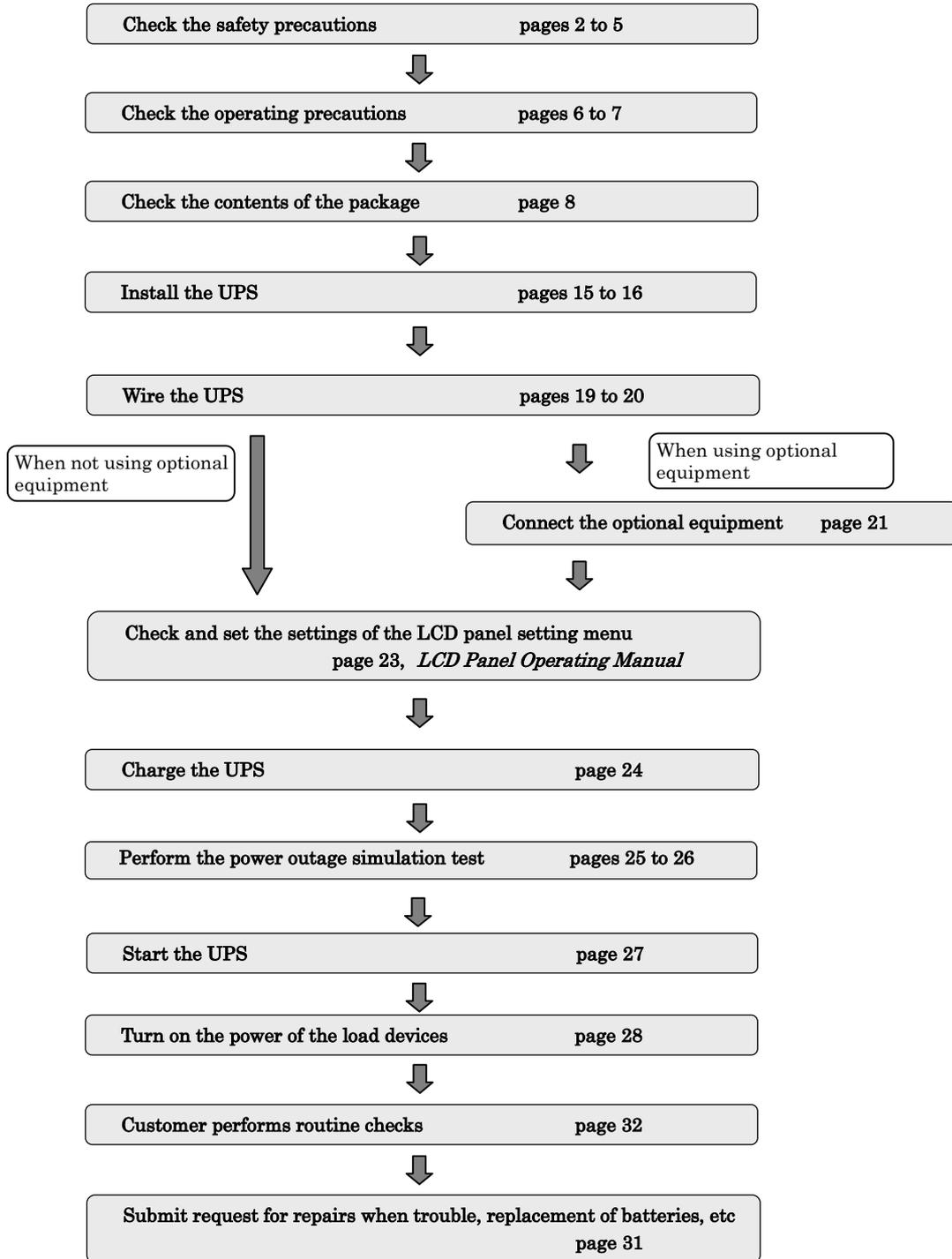
§7. Preparation Before Operation	23
§7.1 Setting and Checking UPS Settings	23
§7.2 Charging UPS	24
§7.3 Power Outage Simulation Test.....	25
§8. Operating Procedures	27
§8.1 UPS Startup	27
§8.2 UPS Shutdown	29
§8.3 Operation Using UPS Unit Control Panel.....	30
§9. Inspection and Maintenance.....	31
§9.1 Routine Checks by Customer	32
§9.2 Battery Test.....	32
§9.3 Resetting Main Breaker	33
§10. Buzzer Sounds.....	34
§11. Troubleshooting	35
§12. UPS Characteristics.....	38
§12.1 Basic Operation.....	38
§12.2 Protective Functions	38
§12.3 Protective Function Table.....	39
§12.4 Specifications.....	40
§13. Warranty.....	41

➤ A11J-S2 model in the table above complies with EN62040-2 Category C3.

Warning: This is a product for commercial and industrial application in the second environment - installation restrictions or additional measures may be needed to prevent disturbances.

§1. Before Use

The following shows the procedures to use the UPS. Be sure to follow the procedures described in this instruction manual to ensure safe and proper use of the UPS.



§2. Safety Precautions

PRECAUTIONS (IMPORTANT SAFETY INSTRUCTIONS)

This manual contains important instructions for operating and maintaining the A11J Series and the batteries to protect the safety of the customers and the service technician.

Before installing, operating, performing maintenance or inspecting the UPS, be sure to read this manual and accompanying documents carefully to obtain a clear understanding of the information related to its operation, safety and important precautions.

This manual described two warning levels, WARNING and CAUTION, as described below.

Label	Explanation
	Denotes immediate hazards which WILL probably cause severe bodily injury or death, as a result of incorrect operation.
	Denotes hazards which COULD cause bodily injury and product or property damage, as a result of incorrect operation.

Additionally, even those hazards denoted by  CAUTION could lead to a serious accident, so the instructions should be strictly followed.

The following labels indicate particularly important instructions which must be carefully followed. The graphic symbols indicate prohibited and mandatory actions.

Symbol	Explanation
	Indicates actions that must not be allowed to occur (prohibited actions).
	Indicates actions that must be taken (mandatory actions). Specific information appears within the graphic symbol or in an explanation nearby.  : This example signifies the mandatory actions.  : This example signifies that the equipment must be securely grounded.
	Indicates CAUTION (including WARNING). Specific information appears within the graphic symbol or in an explanation nearby.  : This example signifies the general caution.  : This example signifies that there is danger of electric shock.  : This example signifies that there is danger of a fire or smoke generation.

1. Relocation, Transportation and Moving Precautions

CAUTION

- Be careful to avoid falling or dropping the UPS during relocation, transportation, as bodily injury could result.
- Be careful to avoid back strain when handling the UPS.
- To avoid bodily injury or a malfunction caused by dropping the UPS, do not tilt the UPS more than 10 degrees to either side when moving it vertically. Take preventative measures to avoid dropping the UPS if it must be tilted more than 10 degrees when moving it.

2. Installation Precautions

CAUTION

- The UPS should be installed only by technically qualified personnel. Improper installation may result in electric shock, bodily injury, and/or fire. 
 - Never operate or store the UPS in the following environmental conditions. Doing so may cause the UPS to malfunction, sustain damage or deteriorate, which could result in a fire or other accidents.  
 - In ambient environmental conditions other than those specified in the product brochure and instruction manual (temperature 0 to 40°C (32 to 104°F)), relative humidity 20 to 90%), such as in an extremely high or low temperature and high humidity.
 - Where the UPS is exposed to direct sunlight.
 - Where the UPS is directly exposed to the heat from a heat source, such as a stove.
 - Where grounding is not possible.
 - Where the UPS may be subject to vibration or physical shock.
 - Near a device that may emit sparks.
 - In the presence of dust, salt or corrosive or flammable gas.
 - Outdoors
 - Be careful not to block the air intake and exhaust vents of the UPS. Keep the front of the UPS at least 20 cm (8 inches) and the back of the UPS at least 15 cm (6 inches) away from a wall or other object. Be careful not to block the air intake and exhaust vents of the UPS. If the air intake or exhaust vent is blocked, the internal temperature of the UPS rises, which could cause battery deterioration resulting in a fire. For maintenance, the UPS requires at least 1 m (40 inches) of space at the front, and at least 50 cm (20 inches) at the back. 
 - The space around the UPS must be ventilated. The table on the right shows the required ventilation airflow. Unless the specified ventilation airflow is maintained, gas produced by battery charging could result in rupture or explosion of the case.  
- | UPS | Ventilation Airflow | |
|---------|---------------------|--------------------|
| | m ³ /h | ft ³ /h |
| A11J502 | 7 | 247 |
| A11J103 | 13 | 459 |
| A11J153 | 20 | 706 |
| A11J203 | 26 | 918 |
- Install the UPS on a stable surface or rack capable of bearing the weight of the UPS in the correct manner specified in this manual. Refer to the table in §5.1 for the weight of the UPS. If the UPS is installed incorrectly, impact or vibration could cause it to fall or move inadvertently, resulting in bodily injury. Be careful to avoid back strain when handling the UPS.
 - Move packaging such as plastic bags and film and accessories such as screws to a place that is out of reach of children. If a child, for example, places film over his or her head or swallows a screw, there is danger of suffocation.

3. Wiring Precautions

CAUTION

- Wiring should be performed only by technically qualified personnel. Incorrect wiring may result in electric shock and/or fire.  
- Protection for primary circuits against over currents, short circuits and earth faults is not provided inside this UPS. Protection in primary circuit against over currents, short circuits and earth faults shall be provided as part of the building installation. 
- Connect the grounding cable as specified (input/output terminal block). This UPS requires class D grounding work. Failure to connect the grounding cable may result in electric shock. Have a qualified electrician perform any grounding work that may be required (a fee will be charged). 
- The grounding cables of all load devices* connected to the output of the UPS must be securely connected to the grounding terminals. Failure to connect the grounding cables correctly may result in electric shock. 

* Load devices are devices such as computers that are connected to the UPS.

4. Operating Precautions

WARNING

- Immediately shut the UPS off if it malfunctions, or if an unusual odor or noise is observed. Failure to do so may result in a fire. 
- To avoid electric shock, do not open the cover of the UPS. Do not detach the cover for the option connections on the back of the UPS except when you use some options. There is danger of electric shock or other accidents. 

PROHIBITED

- Never use the UPS for the following types of loads:
 - a. Medical instruments used for life support.
 - b. Control units for trains or elevators, failure of which could cause bodily injury.
 - c. Computer systems upon which social or public infrastructure depends.
 - d. Devices which serve applications related to the above.
- Contact your sales representative if you need to use the USP in an application like the above. Special equipment, such as redundant devices or an emergency generator must be incorporated when operating, maintaining and controlling systems in which a UPS is used with loads affecting life-support or public infrastructure-dependent applications.
- This UPS must be installed, operated and maintained by technically qualified personnel in an industrial environment. This UPS should not be used in any other environment; for example, a general home environment where a technically qualified personnel is not in.
 - Do not smoke or use an open flame near the UPS, as it could cause the UPS to explode or rupture, resulting in injury or fire.
 - Do not place containers of liquid, such as a flower vase, on the UPS. If the container was to spill, the liquid could cause a short circuit, resulting in sparks or fire inside the UPS.
 - Do not sit, step or lean on the USP, as bodily injury could result if the UPS was to fall.
 - Do not operate the switches with wet hands. There is danger of electric shock.
 - All repairs and modifications to the UPS are prohibited. The UPS contains high voltage and no user serviceable parts. Opening the cover, exchanging the battery, parts exchange, and repair can result in electric shock or other accidents when performed by anyone other than qualified service personnel. All such repairs and modifications will void the warranty.

CAUTION

- Check the load-side safety before starting the UPS, and operate the UPS in accordance with the instructions in the manual.
- The following table shows the UPS states resulting from operation of the **MAIN MCCB**, or **ON/OFF** button. Check the indicators before and after operating. Do not touch the **MAIN MCCB** or **ON/OFF** button unless necessary. If power is supplied incorrectly, electric shock or bodily injury could result.

UPS Status		Output Status	LEDs
MAIN MCCB	ON/OFF	OUTPUT	
OFF	OFF	Stopped	INPUT (off-green), OUTPUT (off-green)
ON	OFF	Stopped	INPUT (on-green), OUTPUT (off-green)
OFF	ON	Output from inverter	INPUT (blinking-green), OUTPUT (on-green)
ON	ON	Output from inverter	INPUT (on-green), OUTPUT (on-green)

- Avoid inserting sharp objects or fingers into the fan. Doing so may result in bodily injury.
- Do not touch the UPS, including the cables, if you hear thunder nearby. There is danger of electric shock from a lightning strike.

5. Maintenance and Inspection Precautions

CAUTION

- Maintenance and repair of the inside of the UPS should be performed only by technically qualified personnel. Electric shock, bodily injury, burns, fuming, or fire may otherwise result. 
- Contact your nearest sales representative or authorized service center to have the UPS checked out or to replace defective parts. Opening the cover carelessly can result in an electric shock or burn. 
- Replace the batteries periodically (once every 4.5 years when operated at 25°C (77°F)). Using batteries after their service life has expired may cause a fire.
- Never use organic solvents such as gasoline, thinner, benzene or detergents to clean the batteries. These can cause the casing to crack and leak, resulting in electric leakage or fire.
- Do not allow metal objects or fingers to touch the battery connectors of the UPS or optional equipment. Doing so may result in an electric shock or burn.
- Do not touch any parts inside the UPS, even when the AC input is removed and the batteries are removed. There is the danger of electric shock from high voltage that remains in parts. 

6. Radio Frequency Interference



- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in the residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

7. Battery Handling Precautions



- Battery servicing should be performed by technically qualified personnel. Keep unqualified personnel away from batteries.
- Replace batteries only with the same model and brand as the ones used for this UPS. Risk of explosion if battery is replaced by an incorrect type.
- The batteries in this product are lead type batteries which are a reusable resource. Please cooperate by recycling when replacing or disposing of used batteries. Dispose of used batteries according to the instructions. Customers should not dispose of used batteries themselves. To dispose of used batteries, contact your nearest sales representative, an authorized industrial waste handling company, or repack them in their original cartons and send them to your supplier or SANYO DENKI.
- Do not use batteries after their service life has expired. Doing so may result in fuming or fire. Additionally, the battery backup function may fail to operate with such batteries, so that power will not be supplied to the load when a power outage occurs.
- Batteries pose hazards for electrical shock and dangerous short-circuit current.. The following precautions should be observed when working with batteries.
 - a. Remove watches, rings and other metal objects.
 - b. Use insulated tools.
 - c. Wear rubber gloves and boots.
 - d. Do not lay tools or metal parts on top of batteries.
 - e. Disconnect the charging source prior to connecting or disconnecting battery terminals.
 - f. Determine whether the batteries have been inadvertently grounded, and if so, remove the source of grounding. Contact with any part of a grounded battery can result in electric shock.
- Do not attempt to open or disassemble batteries. The electrolyte is harmful to the skin and eyes. The battery contains diluted sulfuric acid, which is extremely toxic. If a battery leaks, take appropriate measures to prevent any battery fluid contacting your skin or clothing. Diluted sulfuric acid may cause blindness if it gets into the eye, may burn skin upon contact. It is electrically conductive and corrosive. Observe the following procedures if electrolyte spills:
 - a. Wear full eye protection and protective clothing.
 - b. If sulfuric acid contacts the skin, wash it off immediately with water.
 - c. If sulfuric acid contacts the eyes, flush thoroughly and immediately with water, and seek medical attention.
 - d. Spilled sulfuric acid should be washed down with a suitable acid-neutralizing agent, such as a solution of approximately one pound (500 grams) of bicarbonate of soda in one gallon (4 liters) of water. The bicarbonate of soda solution should be applied until evidence of reaction (foaming) has ceased. The resulting liquid should be flushed with water and the area dried.
- Lead-acid batteries can present a risk of fire due to the generation of hydrogen gas. The following precautions should be observed.
 - a. DO NOT SMOKE near batteries.
 - b. DO NOT allow flames or sparks near batteries.
 - c. Before working with batteries, discharge static electricity from the body by first touching a grounded metal surface before touching the batteries.
- If a fire occurs near a battery, do not use water to extinguish it. Use only a powder-extinguishing agent (ABC). Using water may cause the fire to spread.
- Do not dispose of batteries in fire, as they may explode.
- Strictly observe the following precautions when handling the batteries. Failure to do so may cause battery leakage, overheating or explosion.
 - a. Do not solder to any part of a battery directly.
 - b. Do not charge the batteries with reversed positive (+) and negative (-) terminal polarity.
 - c. Do not mix different battery types, brands or versions.
 - d. Do not attempt to peel off or break the outer covering of a battery.
 - e. Do not subject batteries to strong physical shock, or throw them away.
 - f. Do not use organic solutions such as gasoline, thinner or benzene or detergent to clean the batteries.
 - g. Electrical energy may remain in a battery even after its service life has expired. Do not allow sparks near used batteries, and protect them from short-circuiting.



§3. For Proper Operation

§3.1 UPS Input Power Supply

(1) Input Power Supply and Power Supply Capacity

The following table shows the rated AC input power of this UPS. For the voltage and frequency variation ranges, see §12.4 “Specifications”.

UPS Name	AC Input Voltage Rating	AC Input Frequency Rating	Input Capacity	Input Branch Circuit Breaker*3
Type : A11J502SA002U Model : A11J502US002	*1 200, 220, 230, 240, 208 V (Factory default)	*2 50 Hz or 60 Hz	5.5 kVA	35 A
Type : A11J103SA002U Model : A11J103US002			11 kVA	70 A
Type : A11J153SA002U Model : A11J153US002			16.5 kVA	100 A
Type : A11J203SA002U Model : A11J203US002			19.8 kVA	125 A
Type : A11J203SA002U Model : A11J203US002				

*1. When the UPS is shipped from the factory, this is set to 200 V. Change the setting to match the AC voltage of the area in which the UPS is to be used from the setting menu of the LCD panel. For the setting procedure, see the *LCD Panel Operating Manual*.

*2. When the UPS is shipped from the factory, it is set to automatically detect the AC input frequency (50 or 60 Hz).

*3. The input branch circuit breaker should be compliant with UL489 of the branch circuit protection.

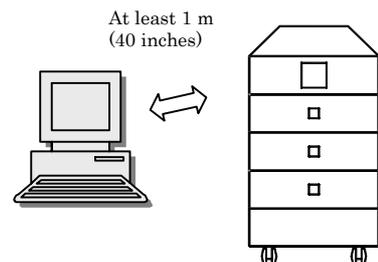
(2) The UPS input should be connected to a single-wire grounded power supply, and the input N should be connected to a ground line.

§3.2 Installation Precautions

(1) Carefully consider the leakage current when a leakage circuit breaker is installed on the input side. The following table shows the maximum leakage current.

UPS	Maximum Leakage Current (mA)
A11J502	12
A11J103	15
A11J153	20
A11J203	25

(2) Keep the UPS at least 1 m (40 inches) away from CRT displays. Other devices which may be sensitive to magnetic flux should be kept away from the UPS, as it emits a slight amount of magnetic flux.



(3) The UPS employs a fan for forced-air cooling. Provide the clearances specified in §6.1.2 “Checking Installation Space” to permit air to flow freely at the air intake and exhaust vents.

(4) Be careful to connect the input poles of loads if the load requires single-wire grounded. Always connect the ground phase to the N terminal of the UPS. For details, see §6.4 “Wiring Inputs/Outputs.”

§3.3 Usage Precautions

- (1) Never short-circuit the output circuits.
Doing so will cause the protective functions of the UPS to activate or the breaker to trip, preventing output.
- (2) Unsuitable load devices
Do not connect laser printers, plain paper fax machines, copy machines, overhead projectors, vacuum cleaners or hair dryers to the UPS. Since such devices are subject to high transient current surges, the UPS will detect current surges and the battery backup operation will become no longer possible when a power outage occurs. There is also the danger of the UPS malfunctioning.
- (3) Power supply environment
If the UPS is used in an environment subject to long and frequent power outages (more than once a week), the batteries may not receive sufficient charge, which could result in foreshortened battery life and premature battery failure.
- (4) If the UPS is stored without being operated for a long period, the batteries may require recharging. If the batteries in the UPS are left uncharged, their service life will be greatly foreshortened. Recharge the batteries in accordance with the UPS storage environment as shown in the table below.
For the time required to recharge the batteries, see §7.2 “Charging UPS.”

Storage Temperature	Recharge Interval
25°C (77°F)	Once every 6 months
30°C (86°F)	Once every 4 months
40°C (104°F)	Once every 2 months

Recharging procedure

Set **MAIN MCCB** on all UPS units to “ON.”
Check that “Green INPUT” lights.
Recharging starts.
Continue operation as is for specified time or longer.
After the specified time or longer elapses,
set **MAIN MCCB** to “OFF.”

- (5) Insulation testing
Before testing the indoor wiring insulation, shut down the UPS and disconnect the input and output cables.
Conducting an insulation test with the UPS connected may damage electronic components such as the built-in arrester.

§4. Checking Contents of Package

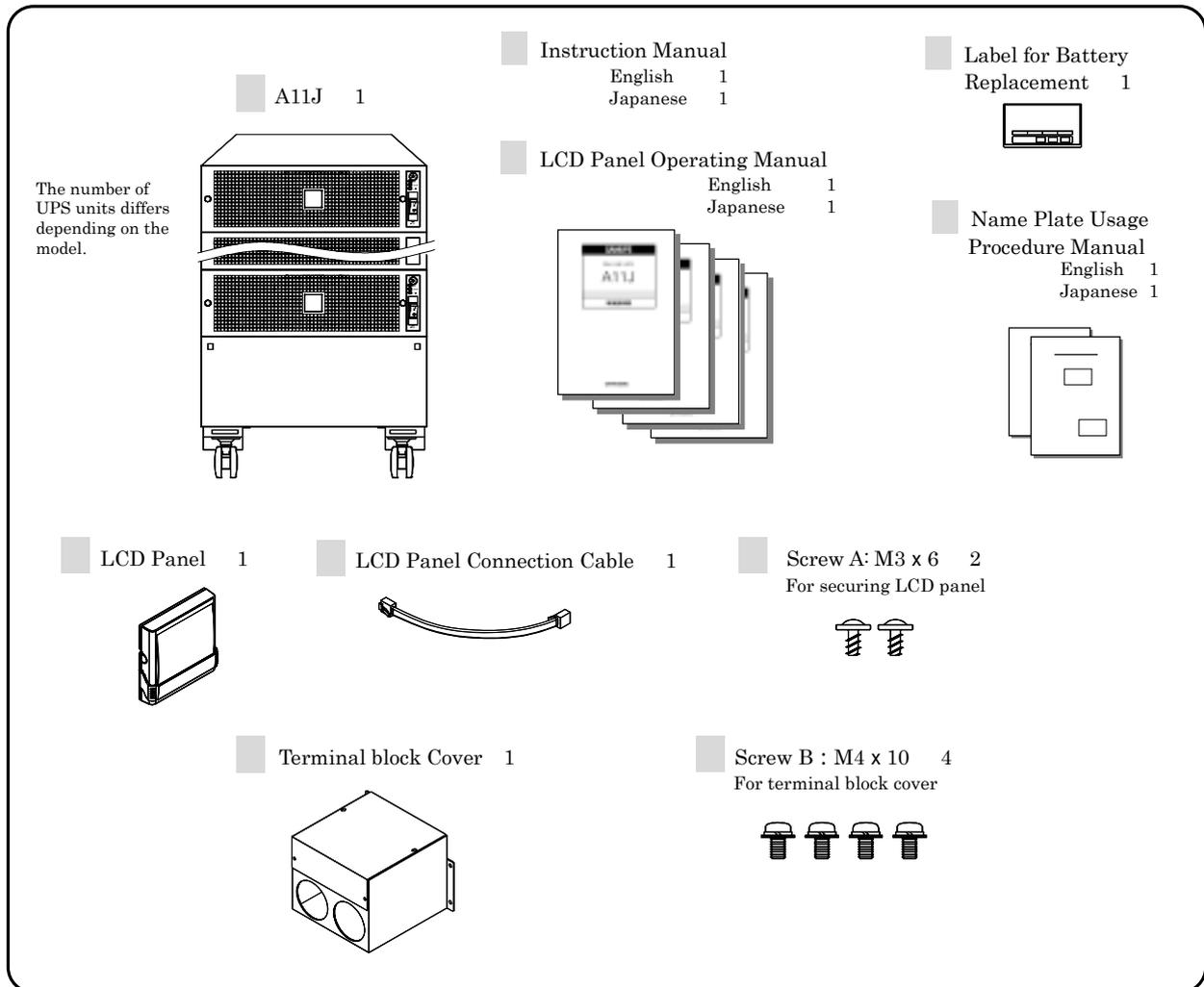
After you open the package, check to make sure that it contains all of the following items.

Does it contain the UPS and all accessories? Is the exterior of the UPS damaged or unusual?

Check and place a mark in .

If any item is missing or unusual, contact your supplier or SANYO DENKI.

This is an image. The actual shapes of the UPS and accessories may differ.

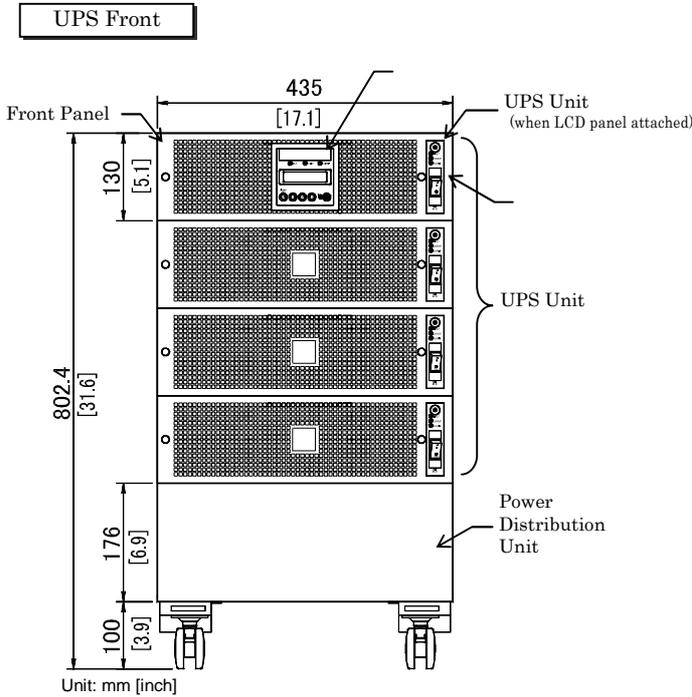


Note on transferring or selling the UPS

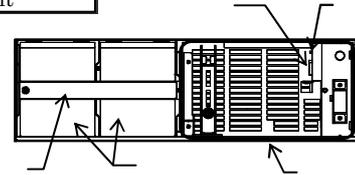
If you sell the UPS or transfer ownership to a third party, transfer or sell all the accessories and other items supplied with the UPS.

§5. External Dimensions and Part Names

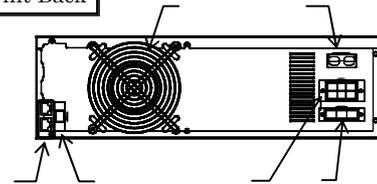
§5.1 UPS



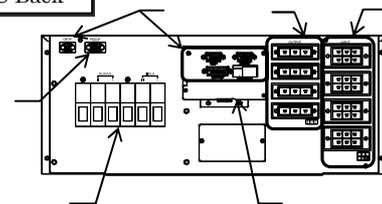
Inside Front Panel of UPS Unit



UPS Unit Back



*1 PDU Back



No.	Name	Label	Function
	LCD panel	See §5.2	UPS status display, measurement display, settings and operation
	UPS Unit control panel	See §5.3	UPS status display and operation
	Battery pack	-	Batteries for backup
	Battery pack securing bracket	-	For securing battery packs
	LCD panel connector	-	For connecting LCD panel
	Forced bypass switch	Forced Bypass	For switching to bypass circuits
	Inverter module	-	Rectifier, charger, inverter, and bypass circuit
	Exhaust vent for cooling fan	-	For ventilation inside the UPS
	Output connectors for connecting between units	OUTPUT	For connecting output between UPS unit and power distribution unit
	Input connectors for connecting between units	INPUT	For connecting input between UPS unit and power distribution unit
	Unit interfaces	UIF A1, UIF A2	For connecting between UPS units
	Power distribution unit interface	PDU IF	For connecting UPS unit and power distribution unit
	Input/output terminal block	OUTPUT N, L, ⊕ INPUT N, L, ⊕	For connecting input power, ground, and load devices
	External interfaces	See §5.4	Interfaces for connecting external devices
	Extension battery connector	EXT. BATTERY	For connecting extension Battery*2
	Option card slot	OPTION CARD	For inserting an option card*2

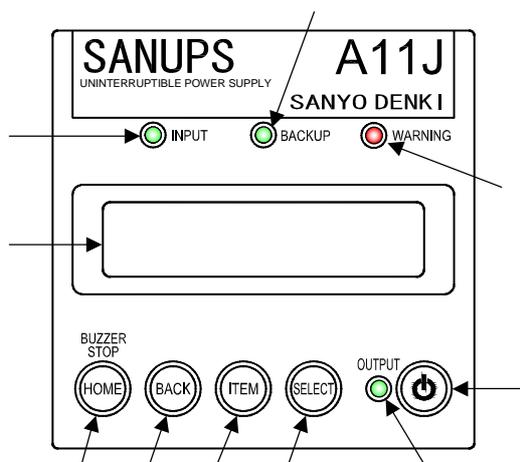
Notes

- *1. PDU is an abbreviation of Power Distribution Unit.
- *2. For information on various optional equipments, contact your supplier or a SANYO DENKI representative.
- *3. The diagram above shows a configuration of four UPS units.
- *4. This is an image created for this instruction manual. The actual UPS may differ.
- *5. In this manual, breakers and switches are displayed enclosed in like MAIN MCCB.

The following table shows the weight and dimensions of each model.

Model	UPS unit qty	Weight						Height		Depth (Excluding protrusions)
		PDU		UPS Unit		Total		mm	in	
		kg	lbs	kg	lbs	kg	lbs			
A11J502US002	1	30	66.1	61	134.5	91	200.6	407.6	16.0	780mm (30.7in)
A11J103US002	2	30	66.1	61×2	134.5×2	152	335.1	539.2	21.2	
A11J153US002	3	30	66.1	61×3	134.5×3	213	469.6	670.8	26.4	Including 80mm (3.2in) of cable cover
A11J203US002	4	30	66.1	61×4	134.5×4	274	604.1	802.4	31.6	

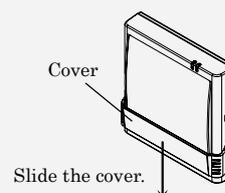
§5.2 LCD Panel



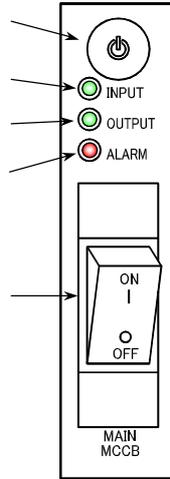
No.	Name	Label	Color	Function	
	Input LED	INPUT	Green	Lit	When input power is normal.
				Blinking	When input power is abnormal.
	Backup LED	BACKUP	Green	Lit	When the battery is operating.
	Warning LED	WARNING	Red	Lit	Caution/warning, malfunction, or end of battery discharge.
	Output LED	OUTPUT	Green	Lit	When supplying power by inverter operation.
				Blinking	When supplying power by bypass operation.
	LCD screen	-	-	Displays UPS status information, measurement values, maintenance support information, various setting values, operation, etc.	
	ON/OFF button	-	-	Starts and stops inverter operation.	
	SELECT key	SELECT	-	Selects and accept LCD display items or contents.	
	ITEM key	ITEM	-	Switches LCD display items or contents.	
	BACK key	BACK	-	Cancels the selection and returns to previous LCD display (menu) level.	
	HOME key	BUZZER STOP HOME	-	Returns the LCD display (menu) level to the home menu. When the buzzer is sounding, stops the buzzer.	

Notes on the LCD panel

- For details on the operating procedure and functions of the LCD panel, see the *LCD Panel Operating Manual*.
- About indications of LEDs
LEDs are displayed in this manual as “Green INPUT” and “Red WARNING”, and the lighting state is indicated as follows:
 LED lights.
  LED blinks.
- About the cover of the LCD panel control section
To operate the ON/OFF button and keys, slide the cover downwards.
After you finish operation, return the cover to its original position to prevent accidental operation.



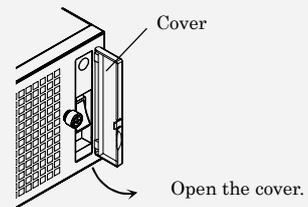
§5.3 UPS Unit Control Panel



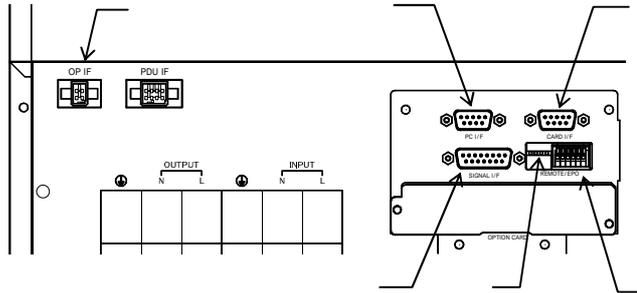
No.	Name	Label	Color	Function	
	Input LED	INPUT	Green	Lit	When input power is normal.
				Blinking	When input power is abnormal.
	Output LED	OUTPUT	Green	Lit	When supplying power by inverter operation.
				Blinking	When supplying power by bypass operation.
	Alarm LED	ALARM	Red	Lit	When there is a malfunction or the battery is exhausted.
	ON/OFF button	-	-	Starts and stops inverter operation.	
	Main breaker	MAIN MCCB	-	Turns ON/OFF the UPS input power and provides protection. Protects the internal bypass circuits.	

Notes on the UPS unit control panel

- In this manual, breakers are displayed enclosed in like MAIN MCCB.
- About indications of LEDs
LEDs are displayed in this manual as “Green INPUT” and “Red WARNING”, and the lighting state is indicated as follows:
 ✱: LED lights. ✪: LED blinks.
- About the cover of the operation section
To operate the MAIN MCCB and ON/OFF button, open the cover.
After you finish operation, close the cover to prevent accidental operation.

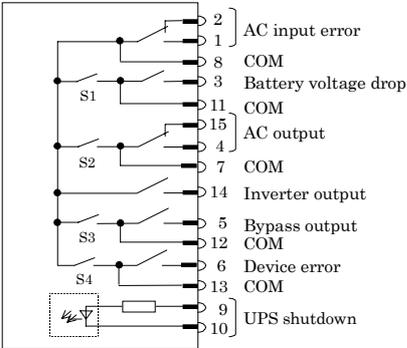
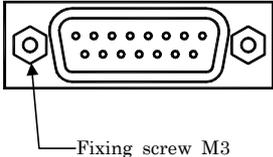


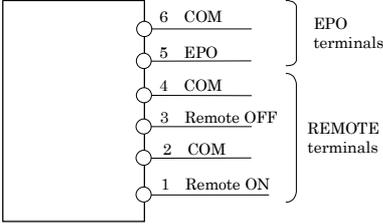
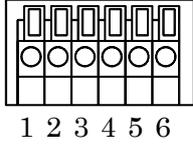
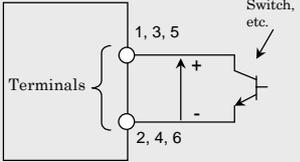
§5.4 External Interfaces



Note
The PC interface connector and card interface connector cannot be used at the same time.

No.	Name	Function
	<p>PC I/F</p> <p>PC interface connector (RS-232C)</p>	<p>When using SANYO DENKI's power management software (option), connect the dedicated communications cable.</p> <p>This interface functions as follows depending on the setting of "Interface" in the LCD panel setting menu.</p> <p>Select the interface according to the function to be used. For the setting procedure, see §3.5 "Setting PC Interface" in the <i>LCD Panel Operating Manual</i>.</p> <ol style="list-style-type: none"> Interface setting: WS (work station) (default setting) <ul style="list-style-type: none"> Use software such as the optional power management software to manage the power and shut down the computer by performing communication between the UPS and computer (personal computer, work station, etc.). For details on power management software, contact your supplier or SANYO DENKI. Interface setting: Standalone (standalone) <ul style="list-style-type: none"> Use the standard UPS service function of the operating system (NetWare, Windows NT, etc.) to shut down the UPS automatically. <p>Note When using a combination of the UPS service function and the power management software (option) with a serial connection, set the interface to WS (work station). If the UPS is used when the setting is set to "standalone", the UPS may shut down suddenly when there is a power outage.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Signal Names</p> </div> <div style="text-align: center;"> <p>External Appearance</p> <p>D-sub 9-pin Male</p> <p>Fixing screw (inch)</p> </div> </div>
	<p>CARD I/F</p> <p>Card interface connector</p>	<p>Connect the connection cable of an optional SANYO DENKI LAN interface card.</p> <p>When connecting a LAN interface card, set the interface to WS (work station). For the interface setting procedure, see §3.5 "Setting PC Interface" in the <i>LCD Panel Operating Manual</i>.</p>

No.	Name	Function																			
	<p>SIGNAL I/F</p> <p>Contact signal interface connector</p>	<p>Outputs status information of the UPS such as a power outage or voltage drop.</p> <p>External Transmission Signals and Shutdown Input Signals</p> <table border="1" data-bbox="512 275 1390 801"> <thead> <tr> <th>Signal Name</th> <th>Explanation</th> <th>Pin No. and Status when Operating</th> </tr> </thead> <tbody> <tr> <td rowspan="6">Output signal</td> <td>AC Input Error</td> <td>This signal is output when there is a power outage or voltage error of the utility power supply. 1-8: ON 2-8: OFF</td> </tr> <tr> <td>Battery voltage drop</td> <td>This signal is output when the battery voltage drops to or below the specified value (approx. 178 V). 3-11: ON</td> </tr> <tr> <td>AC output</td> <td>This signal is output when AC output is being supplied to a load device. 4-7: ON 15-7: OFF</td> </tr> <tr> <td>Inverter output</td> <td>This signal is output when inverter output is being supplied to a load device. 14-8: ON</td> </tr> <tr> <td>Bypass output</td> <td>This signal is output when the utility power supply is being supplied from the bypass circuit. 5-12: ON</td> </tr> <tr> <td>Device error</td> <td>This signal is output when a UPS error occurs. 6-13: ON</td> </tr> <tr> <td>Input signal</td> <td>UPS shutdown</td> <td>The UPS is shut down as a result of receiving 5 V DC (pulse signal of at least 4 sec.) during battery operation when there is a power outage. Current flows at approximately 5 mA when the power is on. This is enabled when the interface is set to Standalone. For the setting procedure, see §3.5 "Setting PC Interface" in the <i>LCD Panel Operating Manual</i>. 9-10</td> </tr> </tbody> </table> <p>External Transmission Signals and Electrical Characteristics</p> <ul style="list-style-type: none"> • Interface: Relay non-voltage contact signal • Contact rating: AC100V/DC50V, 0.1A <p>Note</p> <p>When connecting an inductive/capacitive load, make sure the contact rating is not exceeded.</p> <p>Terminal Names</p>  <p>S1 - S4 : Switches for independent signals (see)</p> <p>External Appearance</p>  <p>D-sub 15-pin Female</p> <p>Fixing screw M3</p>	Signal Name	Explanation	Pin No. and Status when Operating	Output signal	AC Input Error	This signal is output when there is a power outage or voltage error of the utility power supply. 1-8: ON 2-8: OFF	Battery voltage drop	This signal is output when the battery voltage drops to or below the specified value (approx. 178 V). 3-11: ON	AC output	This signal is output when AC output is being supplied to a load device. 4-7: ON 15-7: OFF	Inverter output	This signal is output when inverter output is being supplied to a load device. 14-8: ON	Bypass output	This signal is output when the utility power supply is being supplied from the bypass circuit. 5-12: ON	Device error	This signal is output when a UPS error occurs. 6-13: ON	Input signal	UPS shutdown	The UPS is shut down as a result of receiving 5 V DC (pulse signal of at least 4 sec.) during battery operation when there is a power outage. Current flows at approximately 5 mA when the power is on. This is enabled when the interface is set to Standalone . For the setting procedure, see §3.5 "Setting PC Interface" in the <i>LCD Panel Operating Manual</i> . 9-10
Signal Name	Explanation	Pin No. and Status when Operating																			
Output signal	AC Input Error	This signal is output when there is a power outage or voltage error of the utility power supply. 1-8: ON 2-8: OFF																			
	Battery voltage drop	This signal is output when the battery voltage drops to or below the specified value (approx. 178 V). 3-11: ON																			
	AC output	This signal is output when AC output is being supplied to a load device. 4-7: ON 15-7: OFF																			
	Inverter output	This signal is output when inverter output is being supplied to a load device. 14-8: ON																			
	Bypass output	This signal is output when the utility power supply is being supplied from the bypass circuit. 5-12: ON																			
	Device error	This signal is output when a UPS error occurs. 6-13: ON																			
Input signal	UPS shutdown	The UPS is shut down as a result of receiving 5 V DC (pulse signal of at least 4 sec.) during battery operation when there is a power outage. Current flows at approximately 5 mA when the power is on. This is enabled when the interface is set to Standalone . For the setting procedure, see §3.5 "Setting PC Interface" in the <i>LCD Panel Operating Manual</i> . 9-10																			
	<p>Switches for independent contact signals</p>	<p>Setting these switches to "OFF" makes each contact of the external transmission signals independent.</p> <p>Refer to contact interface connector , and set "ON" or "OFF" according to how the UPS will be used by the customer. The switches are all set to "ON" at the time of shipment from the factory.</p> <p>External Appearance</p>  <p>When all of 1 to 4 are in the "ON" state.</p> <p>Set them to "OFF" when using each contact signal as an independent circuit. Set them to "ON" when using each contact signal as a common COM circuit.</p>																			

No.	Name	Function
	REMOTE/EPO External control terminals	<p>Use these terminals for controlling the UPS with a non-voltage contact from an external device.</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="560 280 906 309" style="border: 1px solid black; padding: 2px;">REMOTE/EPO Terminal Names</div> <div data-bbox="1054 280 1289 309" style="border: 1px solid black; padding: 2px;">External Appearance</div> </div>   <p>REMOTE Terminals (Terminal Nos. 1 to 4) Connect a remote switch for performing the ON/OFF operation of the UPS and shutting down a computer from a remote location. The operation is as follows depending on the interface setting value.</p> <ol style="list-style-type: none"> 1. Interface setting: WS (work station) (default setting) <ul style="list-style-type: none"> ➤ Remote ON of UPS/ One-touch Shutdown of System The OFF operation of the remote switch enables the computer connected to the UPS to be shut down with one touch from a remote location, and then the UPS to be stopped. 2. Interface setting: Standalone (standalone) <ul style="list-style-type: none"> ➤ Remote ON of UPS/Remote OFF of UPS <p>Select the interface according to the function to be used. For the setting procedure, see §3.5 “Setting PC Interface” in the <i>LCD Panel Operating Manual</i>.</p> <p>EPO Terminals (Terminal No. 5 and 6) EPO stands for “Emergency Power Off.” Connect, for example, a switch for an emergency stop of UPS output. If the switch is pressed when there is an emergency, the EPO terminals will enter the short-circuit state and UPS output will stop. After an emergency stop of the UPS has been performed, the UPS remains in the emergency stop state even if the emergency output stop switch is released. Also, the remote ON function cannot be enabled in the event of an emergency stop (when the EPO terminals are in a short-circuited state). To resume operation of the UPS, release the emergency output stop switch (short-circuited state), and press  on the UPS Unit control panel for at least 1 second.</p> <p>For how to connect to the terminals, see §6.5 “Connecting Optional Equipment.” This function will work regardless of whether the interface setting is set to “Standalone” or “WS” (work station).</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p style="text-align: center; border: 1px solid black; display: inline-block; padding: 2px;">Notes on contact of, for example, switch to connect to terminals</p> <p>A switch for connecting to the terminals is not provided as an option for the UPS. Check the following specifications and then connect and use, for example, a switch or a contact of the customer’s system that matches the terminal specifications.</p> <p>Terminal specifications</p> <ul style="list-style-type: none"> • Circuit voltage: +5 V DC • Flowing current when short-circuited: Approx. 10 mA • Operating conditions <ul style="list-style-type: none"> REMOTE: Short-circuit between terminals for at least 1 second. EPO: Short-circuit between terminals for at least 0.2 seconds. • Terminals: One-touch terminal block • Compatible wires: AWG 26 to 20 <p>When using a transistor or other semiconductor switch, connect terminal No. 2, 4, and 6 to the - (minus) pole side as shown in the right chart. (In the case of a non-polar switch, there is no specified connection direction.)</p>  </div>
	OP IF Optional interface connector	<p>This connector is for connecting optional equipment. It cannot be used with this device.</p>

§6. Installation and Wiring

§6.1. Check Before Installation

 <p>CAUTION</p>	<ul style="list-style-type: none"> • Installation work should be performed by technically qualified personnel. When installing the UPS, carefully follow the instructions in this Instruction Manual. Improper installation can result in electric shock, bodily injury, and/or fire.  • Refer to the table in §5.1 for the weight of the UPS. In accordance with the instruction manual, install the UPS on a stable surface that can bear the weight. The surface should be flat, so the UPS cannot fall and cause bodily injury. The possibility of vibration and shock should be minimized at the installation location. Shock and vibration from, for example, an earthquake may cause the UPS to shift or fall, possibly resulting in bodily injury. • For safety, wear protective shoes when performing installation work. All work should be carried out by at least two persons. There is the danger that the UPS may fall or be dropped, resulting in bodily injury. Also, be careful to avoid straining your lower back. • Be careful not to trap a hand or the like when installing the UPS. • There is the danger that the UPS may fall or be dropped during relocation or installation. Always hold the corners at the top sides of the UPS and make sure you do not drop it. Failure to do so may result in bodily injury or damage to the UPS.
---	--

§6.1.1 Checking Installation Environment

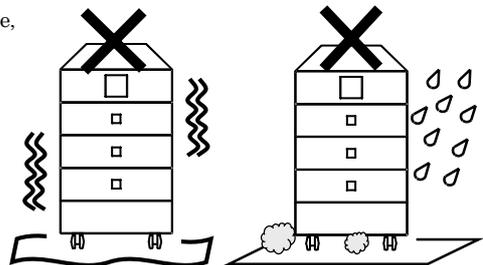
Suitable installation environment: Ambient temperature of 0 to 40°C (32 to 104°F) and relative humidity of 20 to 90%.

Do not install the UPS in the following locations:

- In ambient environmental conditions other than those specified in the product brochure and instruction manual such as in extremely high or low temperature and high humidity.
- Where the UPS is exposed to direct sunlight.
- Where the UPS is directly exposed to the heat from a heat source, such as a stove.
- Where grounding is not possible.
- Where the UPS may be subject to vibration or physical shock.
- Near a device that may emit sparks.
- In the presence of dust, salt or corrosive or flammable gas.
- Outdoors

Note

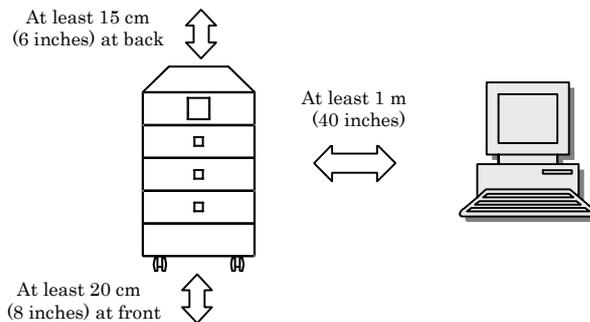
The battery service life will be foreshortened if the UPS is used in an environment where the ambient temperature exceeds 30°C (86°F). We recommend that the UPS is normally used and maintained at a temperature between 20 to 25°C (68 to 77°F).



§6.1.2 Checking Installation Space

During installation, provide the following space around the UPS.

- At least approx. 20 cm (approx. 8 inches) at the front and at least approx. 15 cm (approx. 6 inches) at the back: As air intake or exhaust space for the cooling fan.
- At least 1 meter (approx. 40 inches) from CRT displays: To allow for slight leakage of magnetic flux. Allow some space from devices which might be affected by magnetic flux.



Note on installation

For maintenance of the UPS, provide space of at least 1 meter (40 inches) at the front and at least 50 cm (20 inches) at the back.

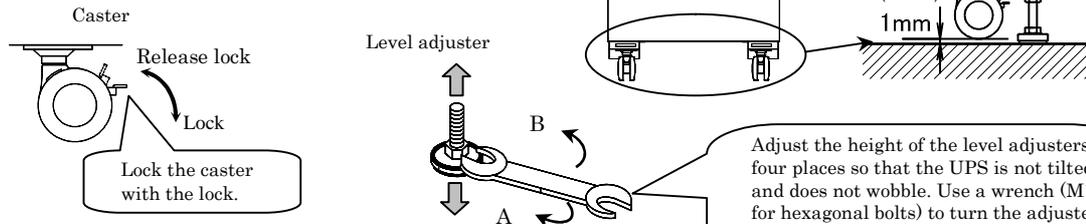
§6.2 Installing UPS



Be sure to lock the casters on the bottom of the UPS, and adjust the level adjusters to fix the UPS so that it is not tilted and does not wobble. If the UPS is not securely fixed, shock and vibration from, for example, an earthquake may cause the UPS to shift or fall, possibly resulting in bodily injury.

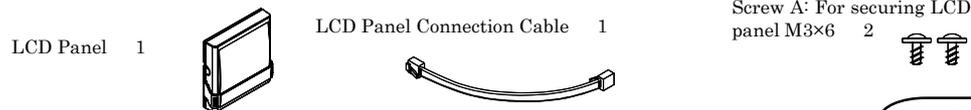
After you open the package, install the UPS as is, and then attach the LCD panel.

- Move the UPS to the installation location.
- Lock the casters in four places.
- Fix the UPS in place with the level adjusters in four places.
- Check that the UPS is securely fixed in place.



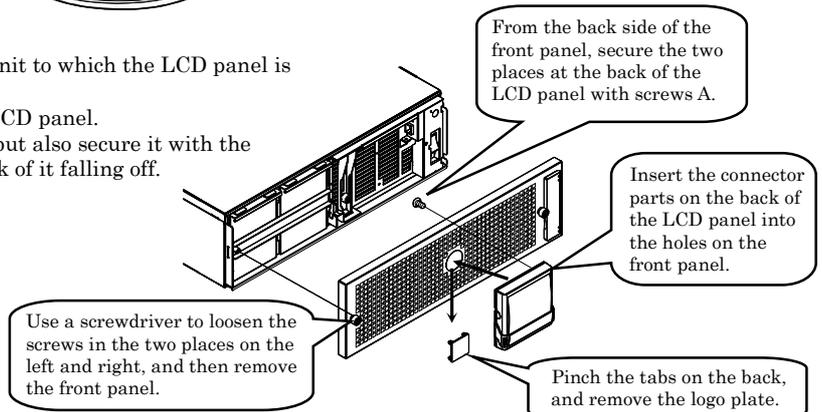
Adjust the height of the level adjusters in four places so that the UPS is not tilted and does not wobble. Use a wrench (M10: for hexagonal bolts) to turn the adjusters in the direction indicated by A in the diagram until the casters are raised approximately 1 mm from the floor.

Prepare the LCD panel, LCD panel connection cable, and two screws A for securing the LCD panel (only when securing the LCD panel) that are supplied with the UPS.



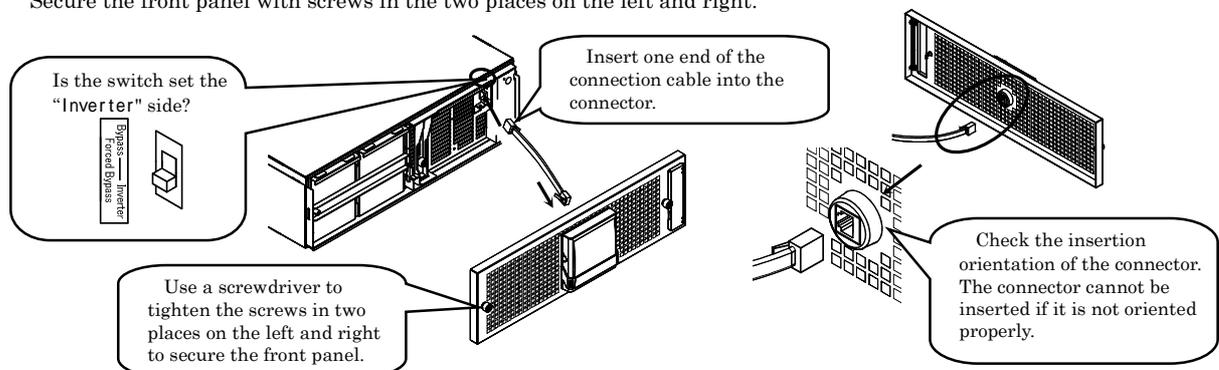
- Remove the front panel from the UPS unit to which the LCD panel is to be attached.
- Remove the logo plate, and attach the LCD panel.
- The LCD panel is secured by magnets, but also secure it with the screws A in two places if there is the risk of it falling off.

Tip
The LCD panel can be attached to any UPS unit. Attach it to the UPS unit that is in an easy to operate position, depending on the installation state of the UPS units.



Use a screwdriver to loosen the screws in the two places on the left and right, and then remove the front panel.

- Insert one end of the LCD panel connection cable into the connector at the position shown in the diagram.
- Check that the forced bypass switch **Forced Bypass** above the connector is set to the "Inverter" side.
- Insert the other end of the cable connected in step 7 into the connector on the back of the front panel.
- Secure the front panel with screws in the two places on the left and right.



Notes

- If the UPS cannot be securely fixed to the floor with the level adjusters, use floor securing brackets (option). In such a case, consider maintenance space before fixing the UPS to the floor. For the installation procedure, see the instruction manual of the floor securing brackets. For details on floor securing brackets, contact your supplier or SANYO DENKI.
- The cables are connected between the UPS units at the time of shipment. If the cables were disconnected upon customer request for transportation and installation, be sure to perform the wiring work properly. For details on wiring between UPS units and the power distribution unit, see §6.3 "Connection Between Units."

§6.3 Connection Between Units

The UPS units and the power distribution unit are connected with the cable as follows. If the cables were disconnected for transportation and installation, see the following figure, be sure to perform the wiring work properly.

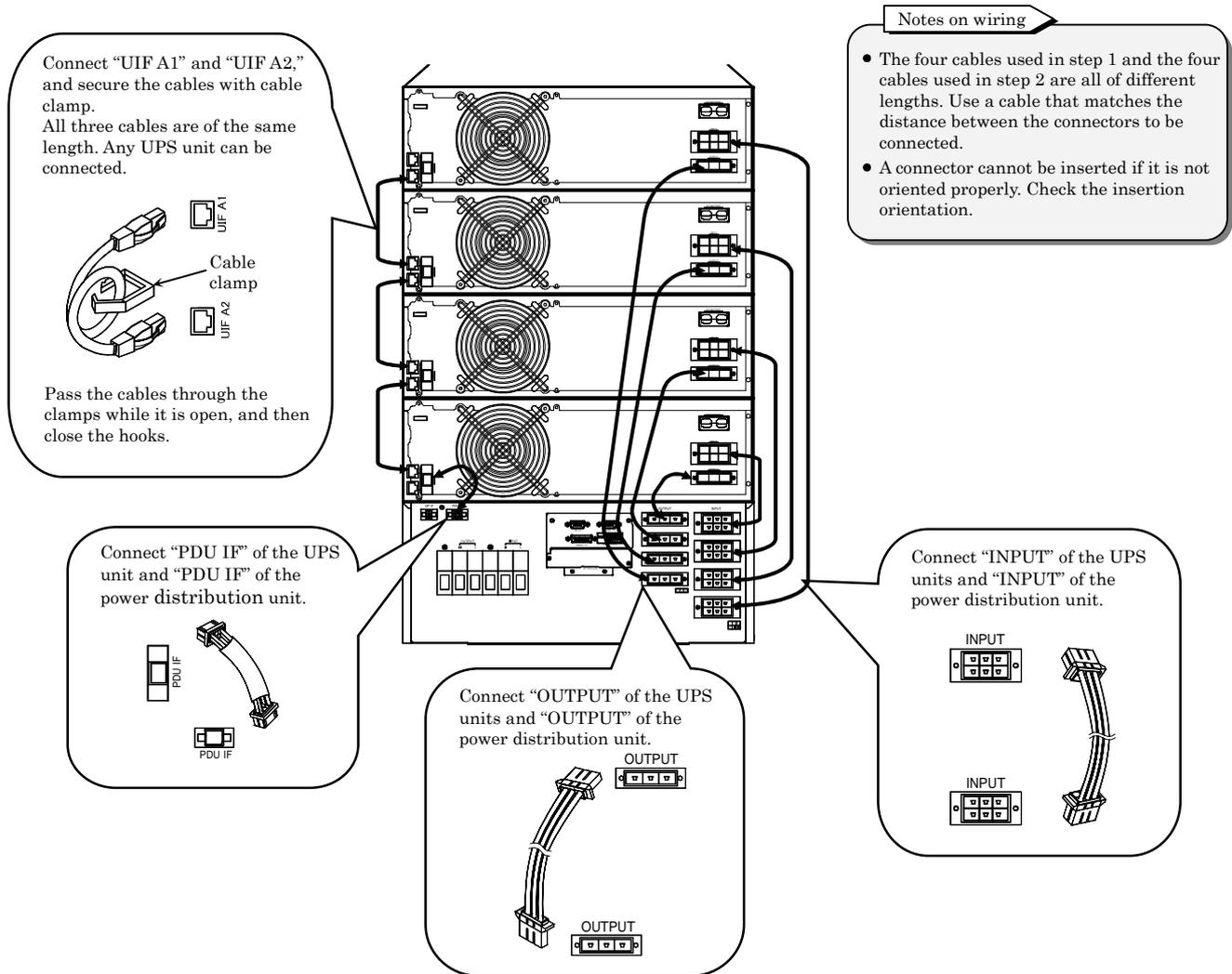
The figure shows four UPS units being connected.

Connect the "INPUT" of the UPS units and power distribution unit with the input cables for connecting between units. Connect the "OUTPUT" of the UPS units and power distribution unit with the output cables for connecting between units.

Connect "UIF A1" and "UIF A2" of the UPS units with the interface cable for connecting between units.

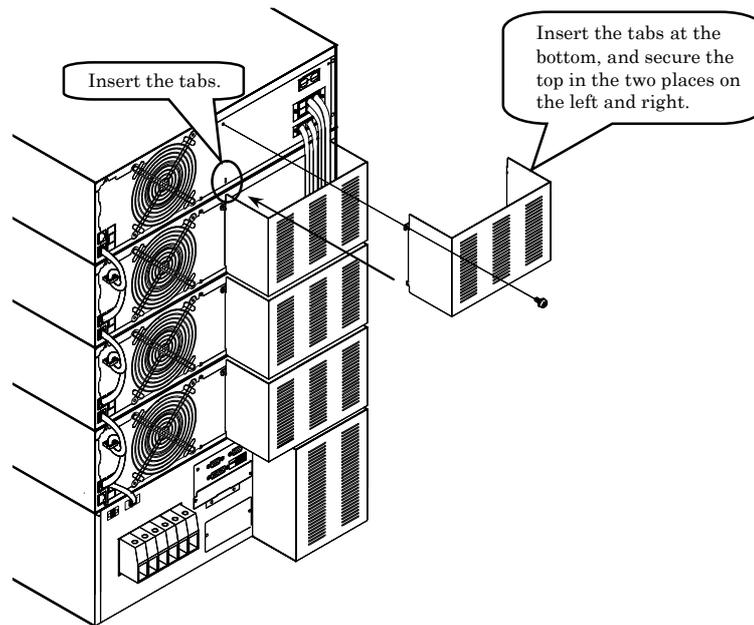
If there is danger of the cables being caught on something, bind the cables as shown in the figure and secure them with cable clamps.

Connect "PDU IF" of the power distribution unit and the UPS unit on the very bottom with the PDU interface cable.



Check that all of the cables are connected securely.

Attach the cable covers to all of the UPS units and the power distribution unit.

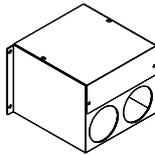


§6.4 Wiring Inputs/Outputs

 CAUTION	<ul style="list-style-type: none"> Wiring work should be performed by technically qualified personnel. When wiring the UPS, carefully follow the instructions in this Instruction Manual. Incorrect wiring may result in electric shock and/or fire.   There is the danger of electric shock, so wear insulated gloves as a preventive measure when performing wiring work. Make sure that the connections of the terminal block are not loose. Failure to do so may result in electric shock, bodily injury, or fire. Be sure to ground the UPS. There is danger of electric shock. Do not use the UPS in a location where it cannot be grounded.
---	--

Prepare the Terminal block cover and four screws B for terminal block cover that are supplied with the UPS.

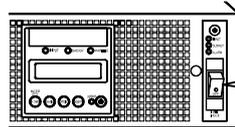
Terminal block cover 1



Screw B: For terminal block cover
M4×10 4



Check that **MAIN MCCB** on the front of all UPS units are set to “OFF.”

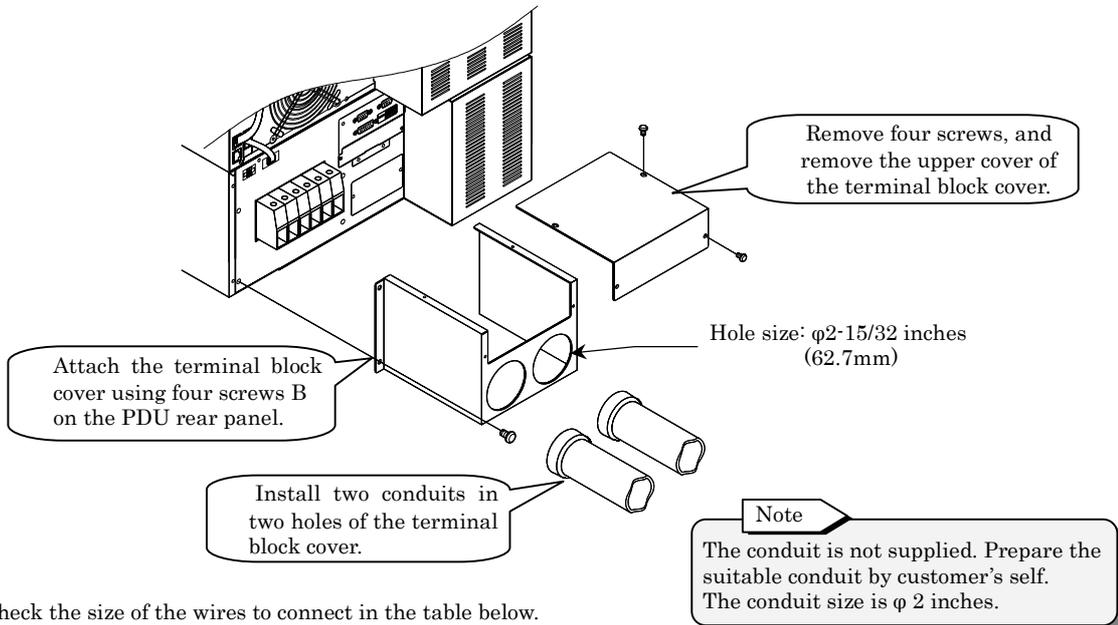


Check that **MAIN MCCB** of all UPS units are set to “OFF.”

Remove the upper cover of the terminal block cover as shown below.

Install a conduit in the hole of the terminal block cover. (Prepare the conduit by customer's self.)

Attach the terminal block cover using four screws B on the PDU rear panel.



Check the size of the wires to connect in the table below.

Connect wires of the specified sizes.

Terminal Type	Label	Wire Size								Torque
		A11J502		A11J103		A11J153		A11J203		
		mm ²	AWG							
INPUT input terminals	L, N	14	6	22	4	50	1	60	1/0	4 N·m
	GROUND 	14	6	14	6	22	4	38	2	4 N·m
OUTPUT output terminals	L, N	14	6	22	4	50	1	60	1/0	4 N·m
	GROUND 	14	6	14	6	22	4	38	2	4 N·m

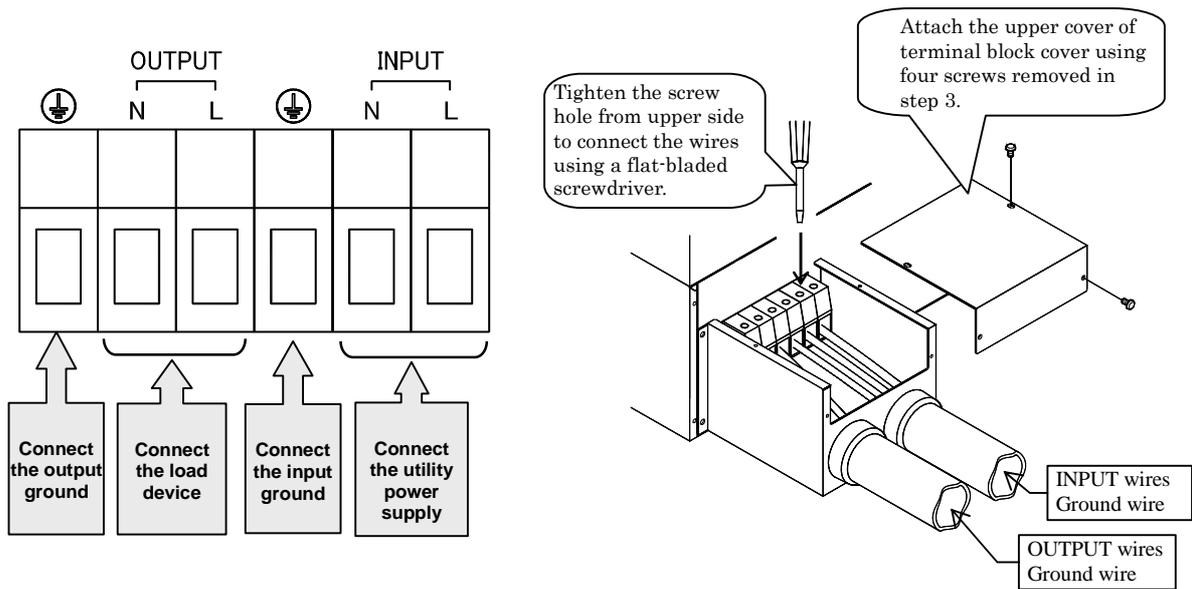
- Connect the ground to the “⏏” terminal of the INPUT terminal. Use D class grounding for the ground.
- Connect the utility power supply to the “INPUT L and N” input terminals.
- Connect the ground to the “⏏” terminal of the OUTPUT terminal. Use D class grounding for the ground.
- Connect the customer’s load devices to the “OUTPUT L and N” output terminals.*

Make sure the total capacity of the load devices to be connected to the terminal block does not exceed the UPS output capacity. Check the UPS output capacity in §12.4 “Specifications.”

***Note**

A breaker for a branch circuit protection of output is needed between the UPS and the customer’s load. The breaker should be compliant with UL489 and proper for the customer’s load and wiring. The breaker capacity should be the value specified in the table.

UPS	Output Branch Circuit Breaker
A11J502US002	35 A
A11J103US002	70 A
A11J153US002	100 A
A11J203US002	125 A



Notes on wiring terminal block

- Terminal Connection Procedure
 1. Strip about 24mm(0.94in.) of insulation each wire. Insert the wire into the terminals.
 2. Tighten the screw hole in the upper of the terminal block with the specified tightening torque(4 N·m) by using a flat-bladed screwdriver.
 3. Pull the inserted wire to make sure that it does not come out.
- When disconnecting wires, disconnect the ground last.
- Be careful with regards to the polarity of input power when performing wiring work. Make sure you connect the ground phase to the N terminal.
- If the load device to be connected is single-wire grounded, be sure to connect the ground phase to N phase side.

- When you have finished the wiring, check that the connections are not loose.
- Attach the upper cover of terminal block cover with four screws removed in step 3.

Unsuitable load devices

Do not connect the following types of load device to the UPS.

Load Devices	Reason
Laser printers, plain paper fax machines, copy machines, overhead projectors, vacuum cleaners, dryers, etc.	Since such devices are subject to high transient current surges, the UPS will detect current surges and the battery backup operation will become no longer possible when a power outage occurs. There is also the danger of the UPS malfunctioning.
Medical instruments, control devices for elevators, computer systems upon which public infrastructure depends	Special considerations need to be given to operation, maintenance, and management, such as system redundancy and the installation of emergency power generation facilities.

§6.5 Connecting Optional Equipment

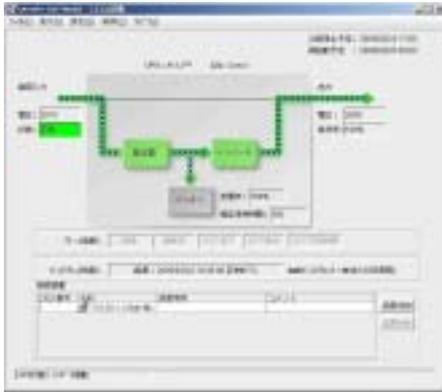
When using, for example, communication cable and optional equipment, connect them to the external interface section. For details on the functions of the external interface section, see §5.4 “External Interfaces.”

Connect optional equipment before starting the UPS. If you want to connect optional equipment after starting the UPS, completely stop the UPS, turn off the input power supply, and then connect the equipment.

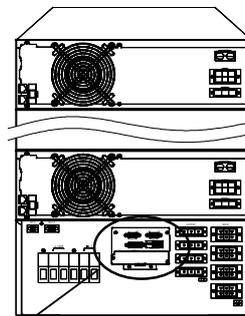
For details on wiring, settings, and other information, see the instruction manuals of the optional equipment. For details on optional equipment, contact your supplier or SANYO DENKI.

Connect the dedicated communication cable and use SANYO DENKI's power management software. The power can be managed with a computer by performing communication between the UPS and computer. For details, see the instruction manual of the power management software.

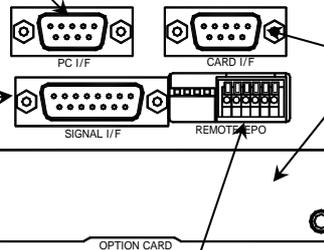
Main Screen of SANUPS SOFTWARE Power Management Software



Back of UPS



Connect when using the external transmission signal function. For details on the functions of the connector, see §5.4 “External Interfaces.”



Connect a SANYO DENKI LAN interface card. For details, see the instruction manual of the LAN interface card.

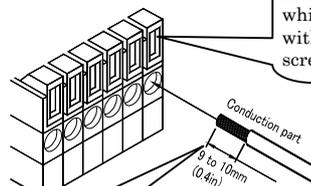
REMOTE/EPO Terminal Connection Method

Connect and use, for example, a switch or a contact of the customer's system that matches the terminal specifications.

For details on the functions of the terminals, see §5.4 “External Interfaces.”

Terminal Connection Procedure

Peel off the coating at the end of the wire by approximately 9 to 10 mm (0.4 inches).
 Insert the wire into the terminal while pressing the tab with a flat-head screwdriver.
 Pull the inserted wire to make sure that it does not come out.



Insert or remove a wire while pressing the tab with a flat-head screwdriver or the like.

Compatible wires: AWG 26 to 20

If the conduction part is short, a secure connection will not be possible.

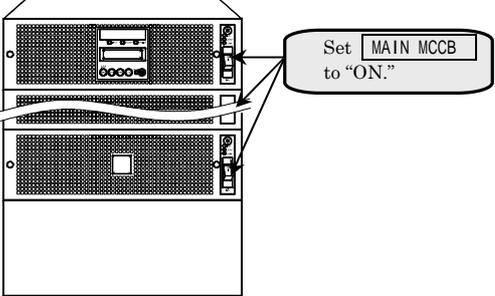
This completes the installation and wiring of the UPS.

Blank page

§7. Preparation Before Operation

§7.1 Setting and Checking UPS Settings

Set **MAIN MCCB** on all UPS units to "ON."



At this time, the state becomes as shown below depending on the setting state of the UPS. Proceed to the corresponding procedure depending on the state of the UPS.

When the buzzer does not sound and the LEDs do not blink

When the buzzer sounds

When the LEDs on the UPS unit control panel blink

Change the setting for the number of UPS units on the LCD panel.

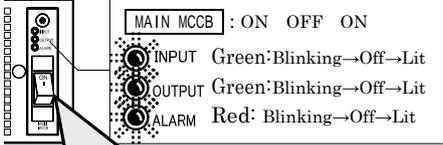
Follow the procedure below to restart the UPS unit with the blinking LEDs.

See §3.19 "Setting Number of UPS Units in Parallel Connection" in the *LCD Panel Operating Manual*, and set the setting.

1. Set **MAIN MCCB** of the UPS unit with the blinking LEDs to "OFF."
2. Check that all of the LEDs of this UPS unit have turned off.
3. Check that the interface cable for connecting between units is connected properly at the back of the UPS. See step 3 of §6.3.
4. Set **MAIN MCCB** to "ON."
5. Check that the LEDs turn on.

Tip

When **MAIN MCCB** is set to "ON," "Total Unit# Err" is displayed on the LCD screen, and the buzzer makes a beep sound (continuous tone). This occurs when the setting value of "Number of UPS Units" in the LCD panel setting menu and the actual number of connected UPS units differ. If you change the setting value for "Number of UPS Units," this message disappears from the LCD screen and the buzzer stops.



Set **MAIN MCCB** to "OFF," check that the LEDs have turned off, and then set it to "ON" again.

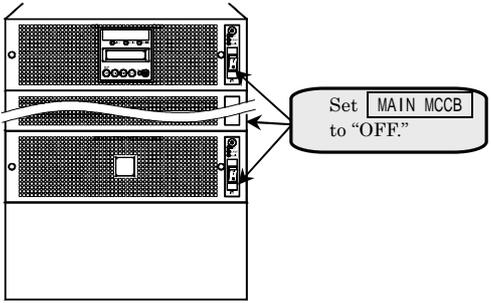
Check the settings in the setting menu of the UPS.

See "List of Settings" in §3 "Setting UPS" of the *LCD Panel Operating Manual*, and check the settings. The factory default settings of the UPS are indicated by the "*" mark in the Default Setting column of the "List of Settings." When the default settings do not match your environment, application, load specifications, and other requirements, change the settings in step 4.

If the buzzer sounds again and the LEDs start blinking again even after performing step 2, contact your supplier or SANYO DENKI.

Change the settings.

See each of the items in §3. "Setting UPS" of the *LCD Panel Operating Manual*.



Set **MAIN MCCB** on all UPS units to "OFF."

Tip

You can also change the settings after starting load device operation. However, the UPS needs to be restarted for setting items indicated by "*" in the Setting Item column of the List of Settings. Setting such items at the preparation stage prior to UPS operation is recommended because the load devices also need to be stopped when the UPS is restarted.

§7.2 Charging UPS

At initial startup or when the UPS has not been operated for a long period, the batteries installed in the UPS should be charged for at least 18 hours as described in the following procedure.

Be sure to charge the UPS before starting up the load devices.

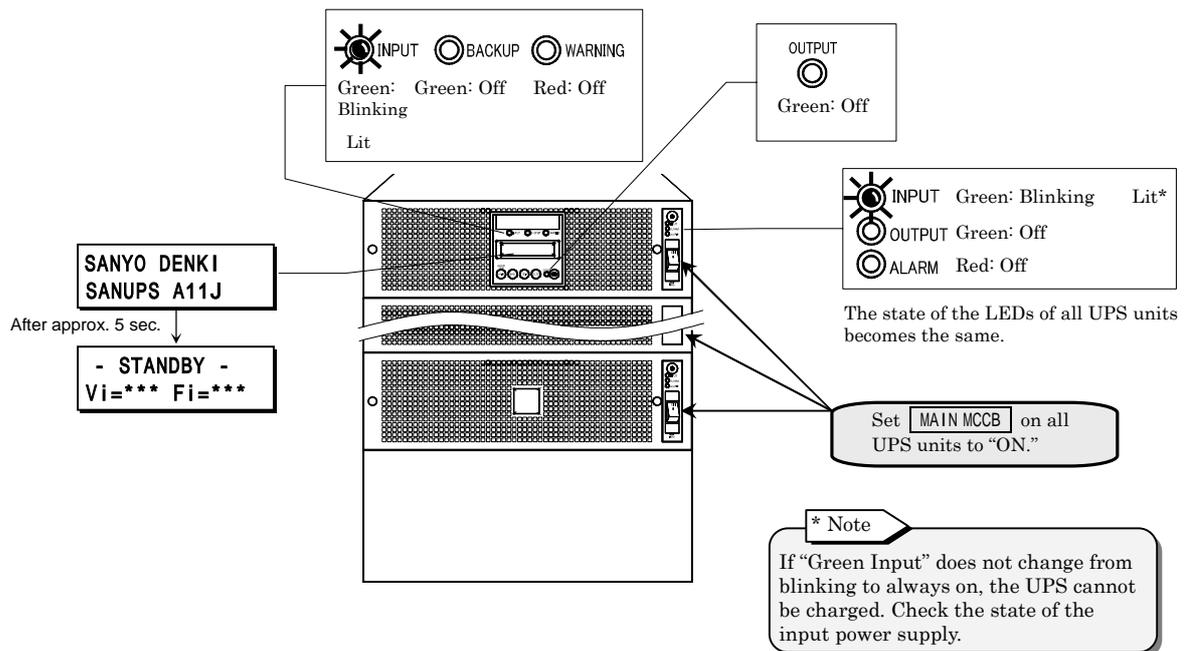
Indications of breakers, LEDs, and LCD in this manual

Breakers are displayed enclosed in like MAIN MCCB, and LEDs of the LCD panel and UPS unit control panel are indicated as "Green INPUT" and "Red ALARM", and the lighting states are indicated as follows:

☀ : LED lights. ✨ : LED blinks.

The states and measurement values of the UPS are indicated as "****" on the LCD screen.

Set MAIN MCCB on the front of all UPS units to "ON."



Check that "Green Input" has changed from blinking to always on.

Charging of the batteries starts automatically.

Operate the UPS for at least 18 hours in this state.

Note on charging time

The UPS should be charged for at least 18 hours to ensure backup in the event of a power outage, but you can use the UPS when the UPS is first started even if there is insufficient charge because the batteries will be charged during operation of the UPS. However, if a power outage occurs at that stage, the full capacity of the backup function may not be available. When an optional extension battery is used, extra charging time is required for the extension battery. See the instruction manual of the extension battery.

This completes the charging of the UPS.

§7.3 Power Outage Simulation Test

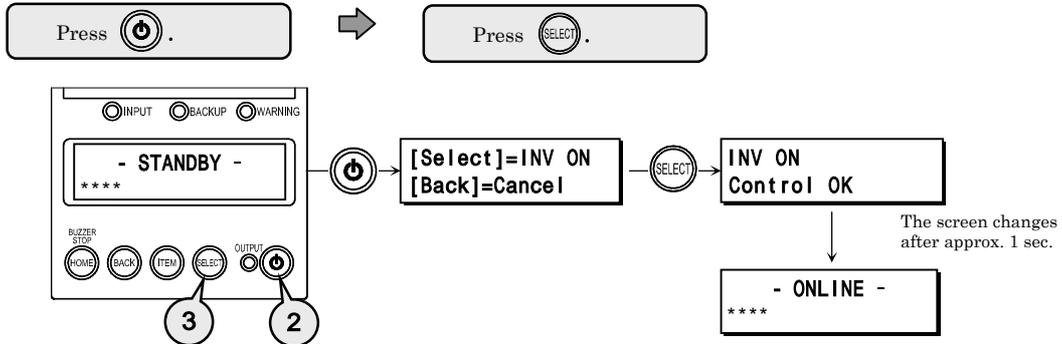
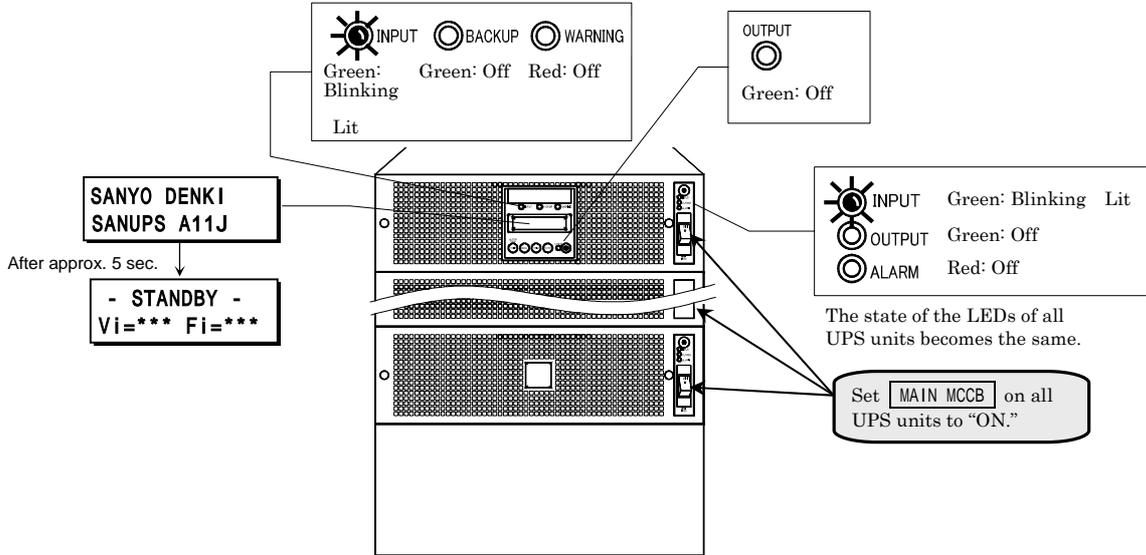
Perform a power outage test to confirm whether the UPS is working properly.

Tip

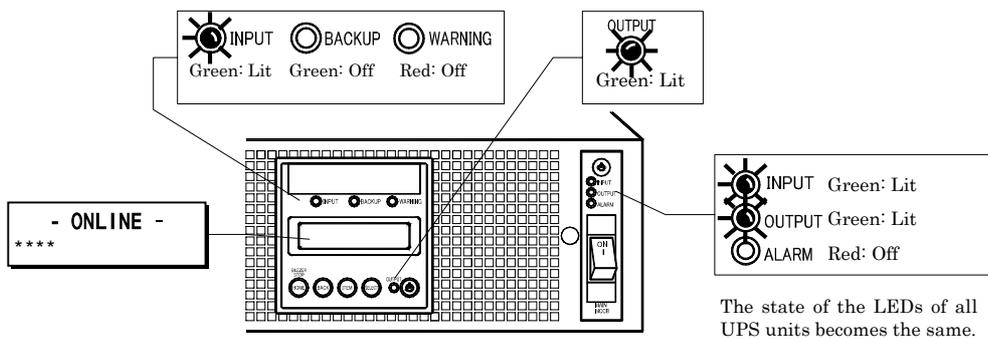
Steps 1 is not necessary if the procedure in §7.2 “Charging UPS” was performed beforehand.

Set **MAIN MCCB** on the front of all UPS units to “ON.”

Check that “Green INPUT” has changed from blinking to always on, and then proceed to step 2.

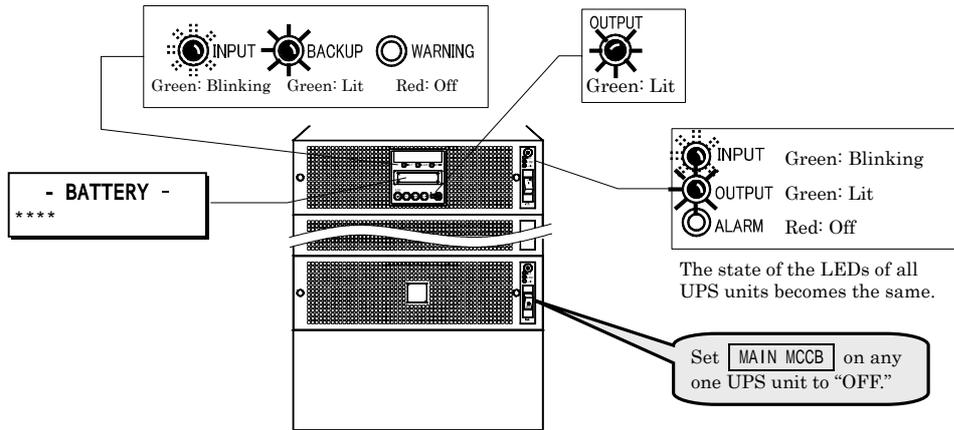


Check that the LCD display and LEDs are in the states shown in the figure below.



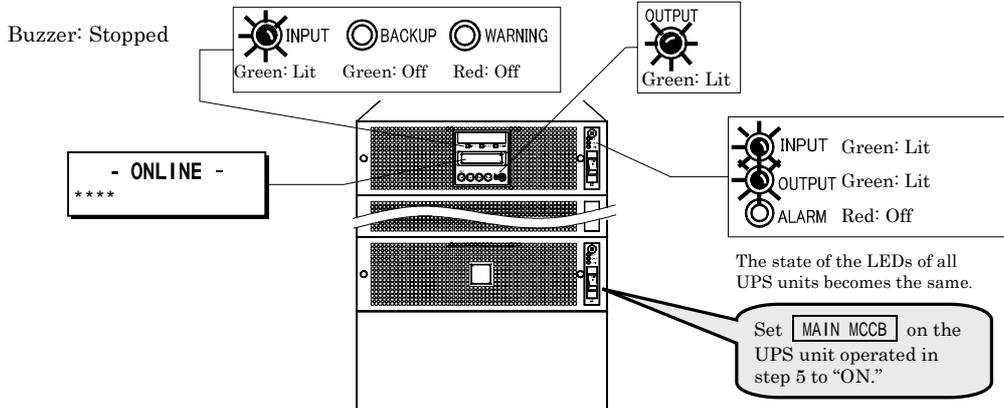
Set **MAIN MCCB** on any one UPS unit to "OFF."

Buzzer: Beep-beep, beep-beep, beep-beep...



Set **MAIN MCCB** on the UPS unit operated in step 5 to "ON."

After 5 seconds elapse, the state becomes as shown below.



When the UPS is working properly, the buzzer sound, LCD display, and LED state will be as indicated in steps 5 and 6.

When the power outage simulation test does not finish properly

Check the possible causes and counter measures in the table below, and then conduct the power outage simulation test again from step 1.

Possible Cause	Countermeasure
Is the forced bypass switch Forced Bypass set to the "Bypass" side?	Set the switch to the "Inverter" side. Step 8 of §6.2 "Installing UPS"
Are the cables connected to the back of the UPS properly?	Connect the cables properly. §6.3 "Connection Between Units"
Is "Green OUTPUT" off?	Perform the ON operation properly. Steps 2 and 3 of §7.3 "Power Outage Simulation Test"
Are "Red ALARM" and "Red WARNING" light?	Contact your supplier or SANYO DENKI.

Contact your supplier or SANYO DENKI when "Red ALARM" and "Red WARNING" light or when the UPS does not operate properly even if you perform the corresponding countermeasure above.

Check that the all UPS units operate properly.

This completes the power outage simulation test.

§8. Operating Procedures

§8.1 UPS Startup

Follow the procedure below to start up the UPS.

Indications of breakers, LEDs, and LCD in this manual

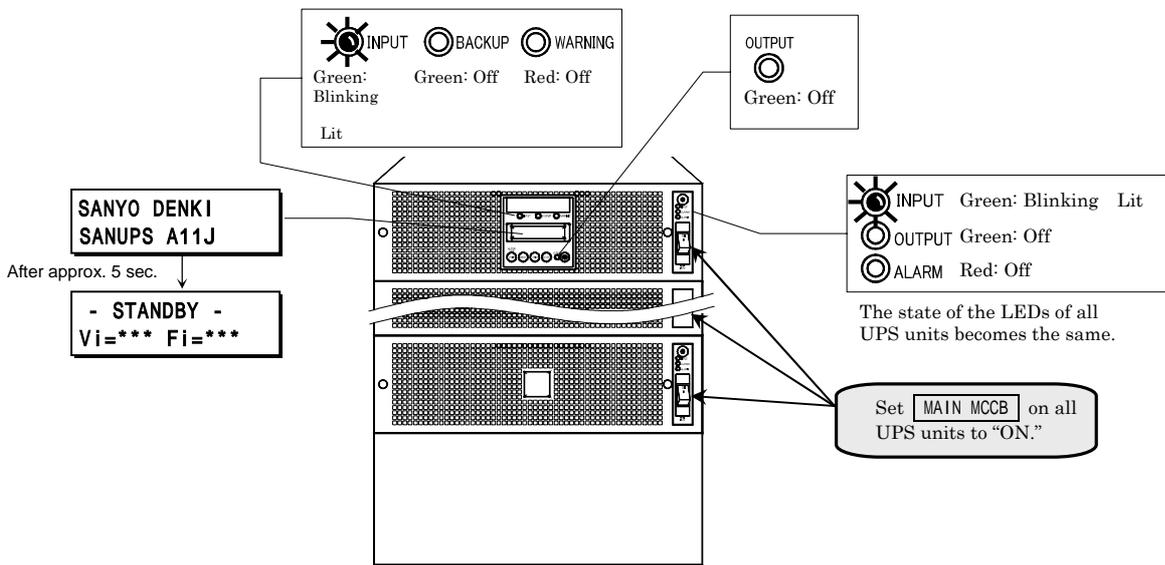
Breakers are displayed enclosed in like MAIN MCCB, and LEDs of the LCD panel and UPS unit control panel are indicated as "Green INPUT" and "Red ALARM", and the lighting states are indicated as follows:

☀ : LED lights. ✨ : LED blinks.

The states and measurement values of the UPS are indicated as "****" on the LCD screen.

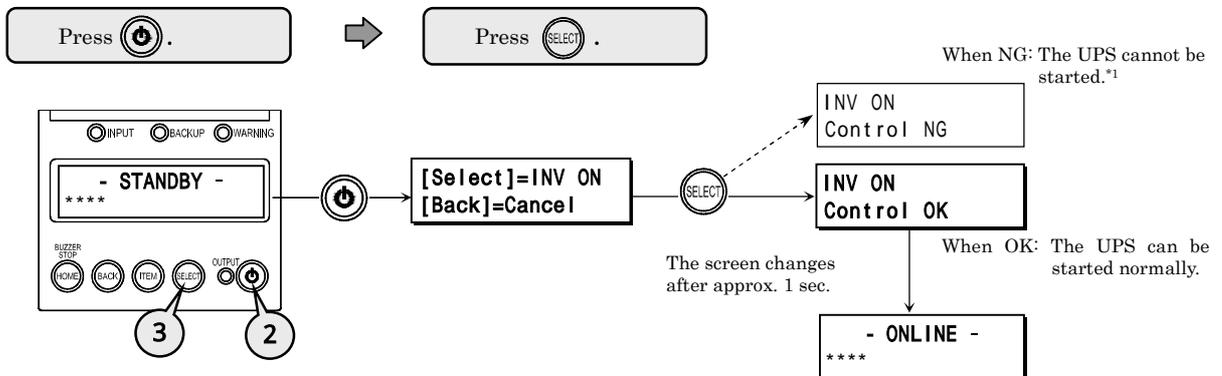
Set MAIN MCCB on the front of all UPS units to "ON."

Check that "Green INPUT" has changed from blinking to always on, and then proceed to step 2.

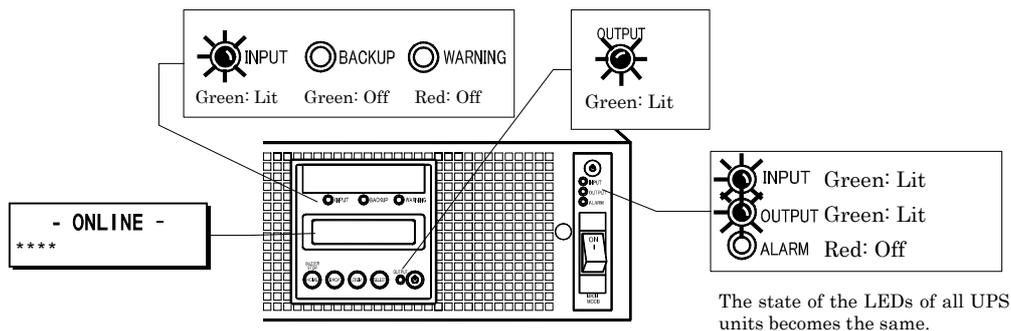


Note

If the time between setting MAIN MCCB of each of the UPS units to "ON" is 30 seconds or more, the buzzer makes a beep sound (continuous tone). The buzzer stops when MAIN MCCB of all UPS units is set to "ON."



Check that the LCD display and LEDs are in the states shown in the diagram below.



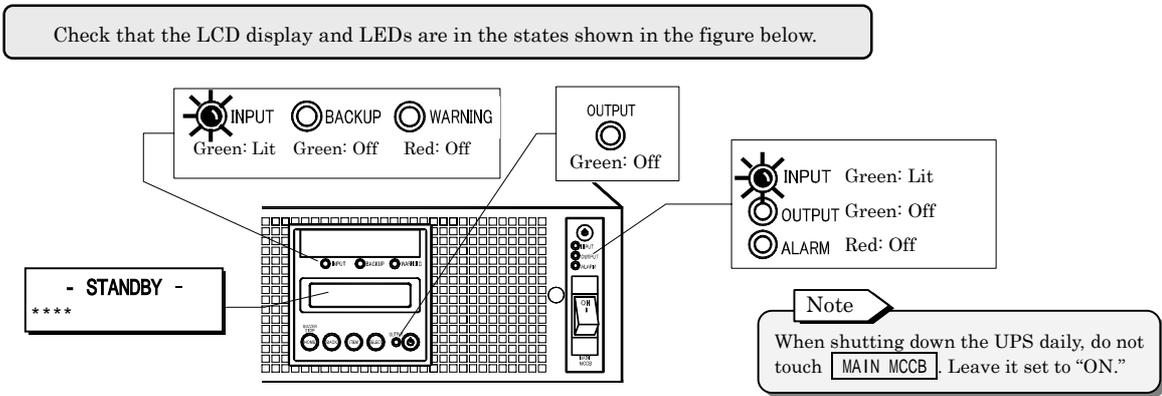
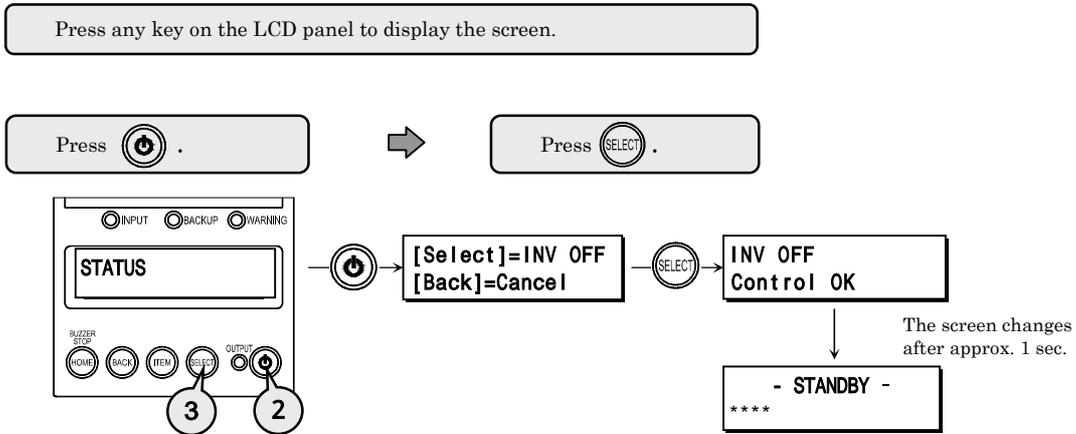
Next, turn on the power of the load devices.*2

Notes on UPS startup

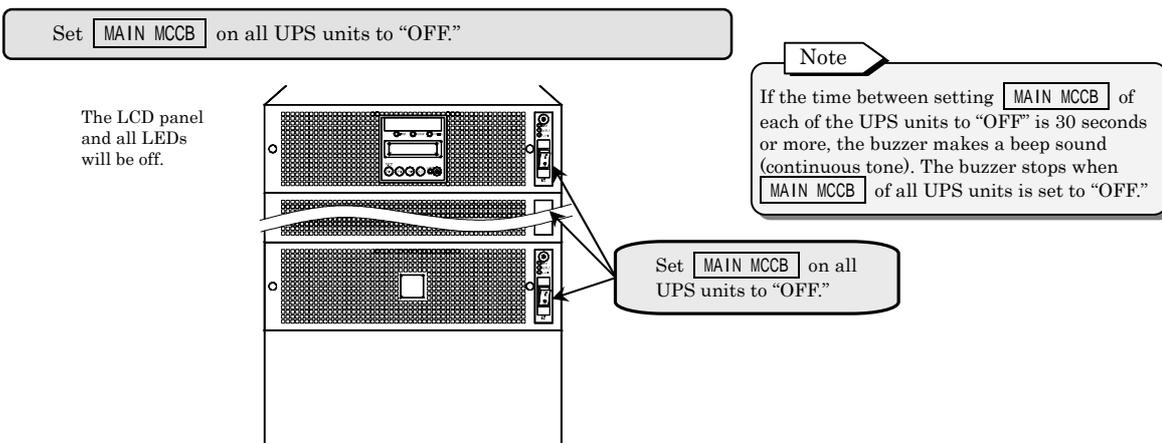
- *1. If the “CONTROL NG” is displayed, the UPS cannot be started because, for example, there is an input power supply error. Check the UPS status of “STATUS” in the home menu of the LCD panel and see §11 “Troubleshooting.”
- *2. Load capacity
If “OVER LOAD” is displayed on the LCD screen and the buzzer sounds in the “****, ****” (4 beeps, 4beeps,) pattern, when the power of the load devices is turned ON, the load devices connected to the UPS exceed the rated capacity of the UPS. Reduce the number of connected load devices. If this state persists even after reducing the load devices to the rated capacity or less, check that all of the output cables connected between UPS units are connected properly. If there is a unit without a cable connected, the total capacity will be reduced by an amount equivalent to the capacity of that unit, and an overload state will occur even at a load capacity that is not above the UPS rated capacity. See §6.3 “Connection Between Units,” and connect it correctly.

§8.2 UPS Shutdown

Follow the procedure below to shut down the UPS. Be sure to shut down the load devices prior to shutting down the UPS.



If the UPS will not be used for one week or more, proceed to step 5.



- Notes**
- If **MAIN MCCB** is set to "OFF" while the UPS is operating, the batteries are discharged as if a power outage occurred. Be aware that when the input supply is restored, the full capacity of the backup function will not be available until the batteries have had time to recharge.
 - If the operation above is performed, the whole UPS system will stop. To stop just one of the UPS units, perform the procedure described in "Shutdown Operation" of §8.3 "Operation Using UPS unit Control Panel."
 - Recharge the UPS periodically when you store the UPS for a long period after shutting down the UPS using the procedure above. For details on charging, see (4) of §3.3 "Usage Precautions."

§8.3 Operation Using UPS Unit Control Panel

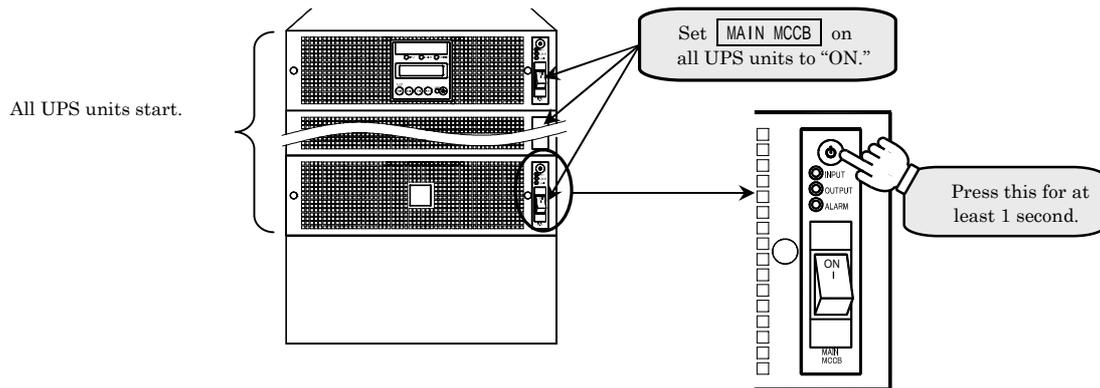
You can use the UPS unit control panel on the right side of the front of the UPS unit to start up and shut down the UPS. The UPS unit control panel can be used to operate individual UPS units, so you can use it to shut down only a UPS unit that has malfunctioned.

Startup Operation

Set **MAIN MCCB** on all UPS units to "ON."

Press the  switch on any one UPS unit for at least 1 second.

All UPS units start.



Shutdown Operation

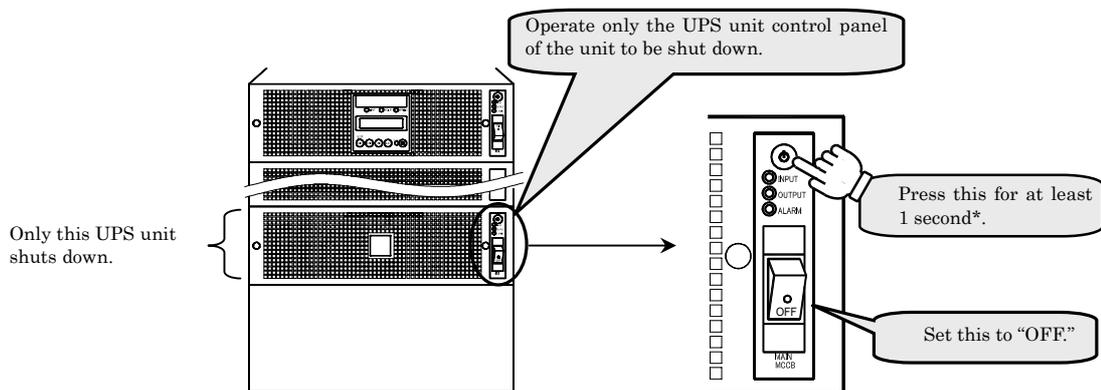
To shut down any one of the UPS units

Press the  switch of the UPS unit to be shut down for at least 1 second.

The UPS unit for which the shutdown operation was performed enters the standby state.

Set **MAIN MCCB** on only this UPS unit to "OFF."

Only the UPS unit for which the shutdown operation was performed shuts down.



Notes

- If  is operated while **MAIN MCCB** on the UPS unit control panel is set to "ON," the UPS operation is as follows.

- Startup Operation: If  of any stopped UPS unit is operated, all of the stopped UPS units start.
- Shutdown Operation: If  of any running UPS unit is operated, only the UPS unit for which the operation was performed shuts down, and the other UPS units continue running.

- Do not continue operation for a long period when there is a mixture of running UPS units and stopped UPS units.

- About the * mark

In the case of the shutdown operation only, the operating procedure differs depending on the setting of " OFF Operation of UPS unit control Panel" in the LCD panel setting menu.

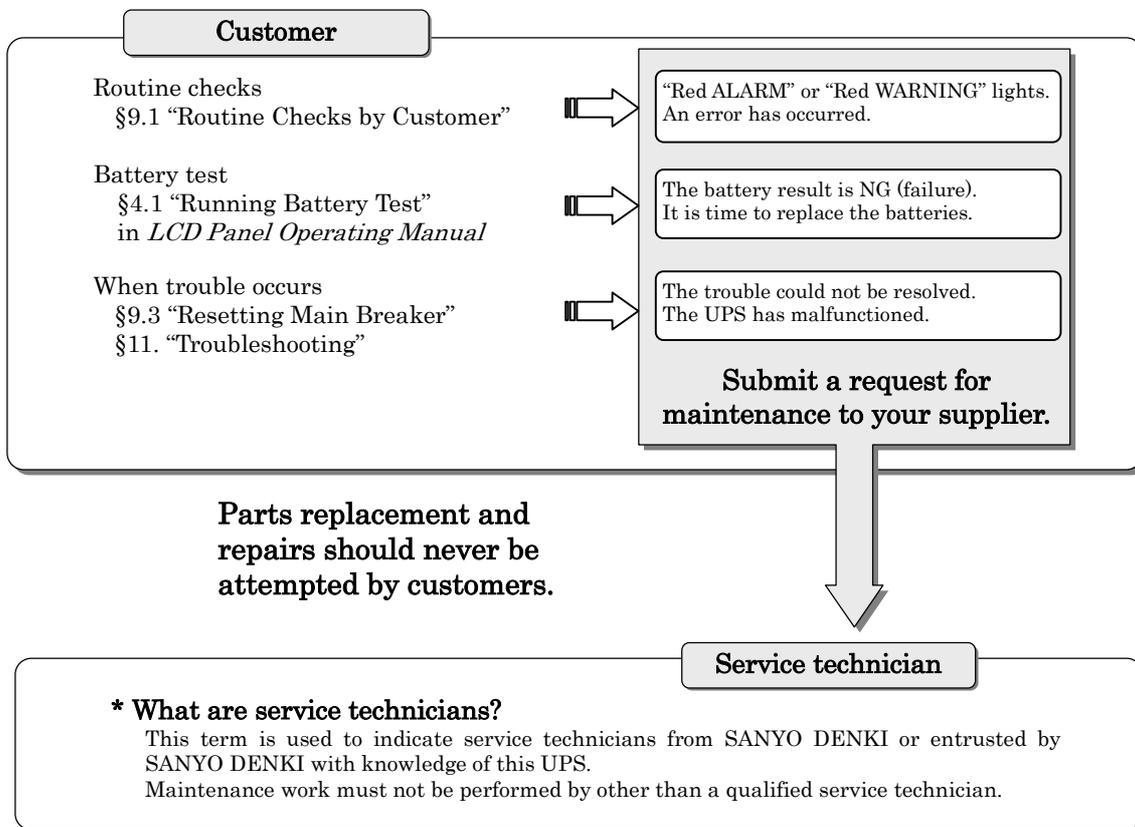
For details, see §3.9 "Setting UPS Shutdown Operation" in the *LCD Panel Operating Manual*.

§9. Inspection and Maintenance

 CAUTION	<ul style="list-style-type: none"> • Internal maintenance and inspection should be performed only by technically qualified personnel. Electric shock, injury, burning, fuming, or fire could otherwise result. • Before beginning Inspection, shut down the UPS completely and remove the input power. Failure to do so may result in an electric shock. • While the batteries are connected to the equipment, hazardous voltage is present. Never touch any parts with your hand. Doing so may result in electric shock. • Batteries should be replaced periodically. • Batteris used after their service life has passed may cause a fire. 	 
---	---	--

The projected service life of this UPS is 10 years. During this period, the batteries must be replaced periodically.

There are routine checks to be performed by the user and maintenance to be performed by a service technician. Some maintenance items are not able to be performed by the user, so be sure to submit a request for such work to your supplier or SANYO DENKI when maintenance is required.



§9.1 Routine Checks by Customer

 <p>CAUTION</p>	<ul style="list-style-type: none"> • Be sure not to inspect the inside of the UPS. Doing so may result in an electric shock, burn, injury, smoke, or fire. • Do not touch the fan on the back of the UPS when cleaning the UPS or anywhere around the UPS. Doing so may result in bodily injury. • Do not use, for example, a wet cloth for cleaning. Doing so may result in electric shock. • When cleaning, do not connect a vacuum cleaner to the output terminal of the UPS. Doing so may result in smoke or fire. 	  
---	--	---

Routinely check the following items.

Is the display state of the LCD panel and UPS unit control panel abnormal?

See §11 “Troubleshooting” and perform the countermeasure.

Is the buzzer sounding?

If any buzzer sounds, see §10 “Buzzer Sounds” and perform the countermeasure.

Is the exterior of the UPS in any way damaged or deformed?

Is an unusual sound or odor emitted from the UPS?

Is the installation environment of the UPS suitable?

Are the humidity and temperature within the specified ranges?

See §6.1.1 “Checking Installation Environment.”

Has the specified amount of space been provided at the front and back of the UPS?

If the air intake or exhaust vent is blocked, the internal temperature of the UPS will rise, which may result in a malfunction of the UPS.

See §6.1.2 “Checking Installation Space.”

Remove any dust or dirt adhering to the intake and exhaust vents.

Dust or dirt adhering to parts inside the UPS may result in a malfunction of the UPS.

Perform the battery backup time test periodically.

When the UPS is shipped from the factory, it is set up to perform an automatic battery test once every 180 days. If you changed the setting for the schedule of the automatic battery test in §3.14 of the *LCD Panel Operating Manual* to “None,” see §4.1 “Running Battery Test” in the *LCD Panel Operating Manual* and periodically perform a manual battery backup test. Depending on the result of the test, replace the batteries.

Estimated battery replacement interval

The battery service life is affected by operating conditions such as ambient temperature and the number of discharge cycles. Ambient temperature has a particularly strong influence as indicated in the following table.

Average Ambient Operating Temperature	Projected Service Life	Battery Replacement Interval
25°C (77°F)	5 years	4.5 years
30°C (86°F)	3.5 years	3 years
35°C (95°F)	2.5 years	2 years
40°C (104°F)	1.7 years	1.5 years

Using a battery after its service life has expired may result in battery leakage, and in the worse case, smoke and fire. Request that the battery be replaced early as a preventative measure.

§9.2 Battery Test

Test the batteries. You can do this without stopping the load devices connected to the UPS. When the UPS is shipped from the factory, it is set up to perform an automatic battery test once every 180 days. To change the schedule of the automatic battery test, see §3.14 “Setting Battery Test Schedule” in the *LCD Panel Operating Manual*. If the UPS has performed a backup operation within 12 hours prior to the test, the result may show an error. In such a case, conduct the test again when the UPS has not performed a backup operation within the last 12 hours.

To perform a manual backup test:



See §4.1 “Running Battery Test” in the *LCD Panel Operating Manual*.

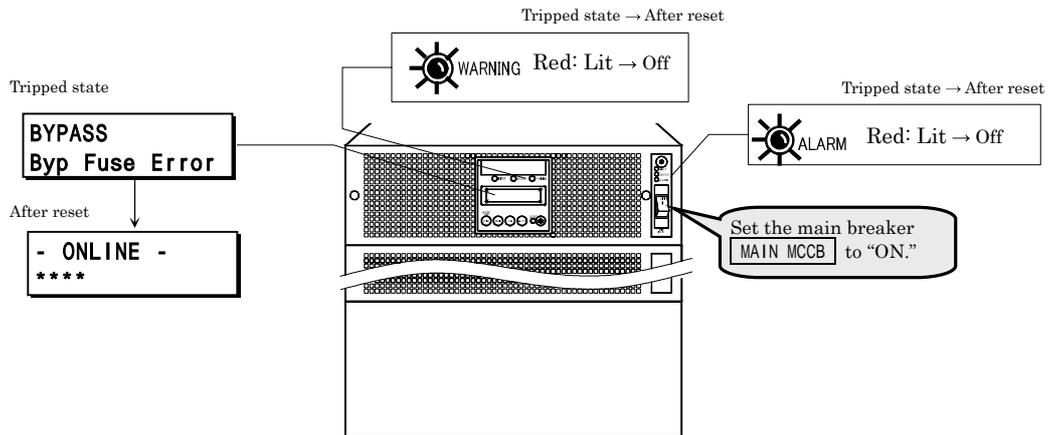
§9.3 Resetting Main Breaker

If the total capacity of the load devices connected to the UPS exceeds the rated capacity of the UPS, the main breaker **MAIN MCCB** of the UPS unit control panel on the UPS unit trips. If a breaker is tripped, the power supply may stop. Follow the procedure below to reset the breaker.

Check that there is no abnormality with the connected load devices, and reduce the load capacity.

Set the tripped **MAIN MCCB** of the corresponding UPS unit to “ON.”

Check that the states of the LCD panel and LED indicators are as shown in step 4 of §8.1 “UPS Startup.”



§10. Buzzer Sounds

The buzzer sounds to indicate a UPS status error or change. Check the sound pattern and see the following table for the countermeasures to take.

Tip

Press  to stop the buzzer.

Sound Pattern	LCD Indication	LED Status	UPS Status	Countermeasure
Continuous tone * _____	Total Unit# Err Fatal Error	Red ALARM Lit Red WARNING Lit	The number of connected UPS units and the setting value differ.	<ul style="list-style-type: none"> Set the number of connected UPS units properly. See §3.19 "Setting Number of UPS Units in Parallel Connection" in the <i>LCD Panel Operating Manual</i>. Check whether the interface cables between the units are connected properly. See §6.3 "Connection Between Units."
	Fatal Error	Red ALARM Lit Red WARNING Lit	The UPS has malfunctioned.	Contact your supplier or SANYO DENKI.
	Byp Fuse Error	Red ALARM Lit Red WARNING Lit	[When bypass power supply] [MAIN MCCB] has tripped (OFF).	Check the load capacity and whether there is a short circuit. If the load capacity is large, reduce the number of connected devices, and set [MAIN MCCB] to "ON." See §9.3 "Resetting Main Breaker."
	AUX2 Error	Red ALARM Lit Red WARNING Lit	The auxiliary power supply has failed.	Contact your supplier or SANYO DENKI.
	LCD Error	Red WARNING Lit	The LCD panel has malfunctioned.	Contact your supplier or SANYO DENKI.
	Batt Vol End	Red ALARM Lit Red WARNING Lit	The batteries are exhausted.	When the utility power is restored, the UPS will restart automatically depending on the setting value of "UPS Operation Upon Power Recovery" in the LCD panel setting menu. See §3.7 "Setting UPS Operation Upon Power Recovery" in the <i>LCD Panel Operating Manual</i> .
<div style="text-align: center;"> 2 seconds ** ** 2 beeps 2 beeps </div>	Input Error Input Freq Err Input Vol Hi Input Vol Low	Green INPUT Blinking Green BACKUP Lit	Power is being supplied from the batteries because of an input voltage or input frequency error.	<ul style="list-style-type: none"> Check that the input voltage and input frequency are within the rated ranges. See §12.4 "Specifications." Are all [MAIN MCCB] set to "OFF"? If they are set to "OFF," set them to "ON."
	Test Condition Testing	-	The UPS is performing a battery test.	Wait for the battery test to end. To stop the battery test, see the procedure to stop the battery test in §4.1 "Running Battery Test" in the <i>LCD Panel Operating Manual</i> .
Continuous beeps ***** ...	Batt Vol Low	Green INPUT Blinking Green BACKUP Lit	The battery voltage is low.	<ul style="list-style-type: none"> Check that the input voltage and input frequency are within the rated ranges. See §12.4 "Specifications." Are all [MAIN MCCB] set to "OFF"? If they are set to "OFF," set them to "ON."
<div style="text-align: center;"> 2 seconds **** ****... 4 beeps 4 beeps </div>	Over Load	-	The load capacity of devices connected to the terminal block of the UPS exceeds the rated capacity of the UPS.	Reduce the number of load devices connected to the terminal block of the UPS.
<div style="text-align: center;"> 2 seconds ***** *****.. 7 beeps 7 beeps </div>	Batt Vol Error	-	[When UPS starts] The batteries may not be connected securely.	Check that the battery pack securing brackets of all UPS units are attached securely.
	Last Result BATTST: NG BATTST: Suspended	-	[When performing battery test] The battery check result was an error.	See §7.2 "Charging UPS," charge the batteries for at least 12 hours, and then see §4.1 "Running Battery Test" in the <i>LCD Panel Operation Manual</i> and perform the battery test again. If the result is the same, the batteries need to be replaced. Contact your supplier or SANYO DENKI.
<div style="text-align: center;"> 2 seconds ***** *****.. 5 beeps 5 beeps </div>	Batt Life Warn	-	The remaining battery service life is 6 months.	Battery replacement is recommended. Contact your supplier or SANYO DENKI early. Press  to stop the buzzer. The buzzer will sound again each time you start the UPS. This will continue until you replace the batteries.
	Batt Life End	-	The service life of the batteries has ended.	The batteries need to be replaced. Contact your supplier or SANYO DENKI. Press  to stop the buzzer. The buzzer will sound again each time you start the UPS. This will continue until you replace the batteries.

Note

If any other trouble occurs or you think there is a malfunction, contact your supplier or SANYO DENKI.

§11. Troubleshooting



- Internal maintenance and inspection should be performed only by technically qualified personnel. Electric shock, injury, burning, fuming or fire could otherwise result.
- Before beginning inspection, shut down the UPS completely, and remove the input power. Failure to do so may result in an electric shock.
- While the batteries are connected to the UPS, hazardous voltage is present. Never touch any parts with your hand. Doing so may result in an electric shock.

Check the status of the UPS and see the following table for the countermeasures to take.

1/3

UPS Status	LCD Indication	LED Status	Countermeasure
The UPS does not start.	-	Green INPUT Off	<ul style="list-style-type: none"> • Is the input power supply connected to the input/output terminal block of the UPS properly? See §6.4 "Wiring Inputs/Outputs," and connect it properly. • Are all the cables between the UPS units connected properly? See §6.3 "Connection Between Units," and connect each of the cables properly. • Are all MAIN MCCB set to "ON"? See §8.1 "UPS Startup" and check the correct operating procedure.
The buzzer sounds when the UPS starts.	Batt Vol Error	-	<ul style="list-style-type: none"> • Are the battery pack securing bracket of all UPS units attached securely? Stop the UPS, and remove the front panel, then check that the securing brackets of all UPS units are attached securely. The securing brackets are not securely attached unless the battery packs are installed properly.
When the UPS starts, all of the LEDs of the UPS units blink.	-	Green INPUT Blinking Green OUTPUT Blinking Red ALARM Blinking	<ul style="list-style-type: none"> • The settings of each UPS unit differ. See step 2 of §7.1 "Setting and Checking UPS Settings," and restart the UPS units. • Are the interface cables between the units connected properly? See step 3 of §6.3 "Connection Between Units," and connect the interface cables between the UPS units properly.
No power is supplied from the terminal block of the UPS.	-	Green OUTPUT Off	<ul style="list-style-type: none"> • Is the input power supply connected to the UPS properly? See §6.4 "Wiring Inputs/Outputs," and connect it properly. • Check that the input voltage and input frequency are within the rated ranges. See §12.4 "Specifications." • Was the startup operation performed in accordance with the correct procedure? See §8.1 "UPS Startup" and check the correct operating procedure.
	-	All: Off	<ul style="list-style-type: none"> • Are all MAIN MCCB set to "ON"? See §8.1 "UPS Startup" and check the correct operating procedure. • Has MAIN MCCB been tripped (OFF) by an overload or short circuit state? Check the load capacity and whether there is a short circuit. If the load capacity is high, reduce the number of load devices connected to the terminal block of the UPS, and set MAIN MCCB to "ON." See §9.3 "Resetting or Main Breaker."
	Input Error Input Freq Err Input Vol Hi Input Vol Low	Green INPUT Blinking	<ul style="list-style-type: none"> • Is the voltage of the UPS set properly? See §3.1 "Setting Voltage" of the <i>LCD Panel Operating Manual</i>, and check the setting. • Check that the input voltage and input frequency are within the rated ranges. See §12.4 "Specifications."
	Remote OFF	-	<ul style="list-style-type: none"> • The remote OFF signal is set to "ON." See §5.4 "External Interfaces."
	EPO ON	-	<ul style="list-style-type: none"> • The EPO signal is set to "ON." See §5.4 "External Interfaces."
Power from the terminal block of the UPS does not stop.	-ONLINE-	Green OUTPUT Lit	<ul style="list-style-type: none"> • Was the shutdown operation performed in accordance with the correct procedure? See §8.2 "UPS Shutdown." However, bypass power supply will continue during bypass operation if it was started by, for example, a change over with the forced bypass switch, an overload, or malfunction. • If the shutdown operation was performed by pressing  on the UPS unit control panel, was the shutdown operation performed in accordance with the setting value? Is "UPS Shutdown Operation" in the LCD panel setting menu set to "3 Sec." (3 seconds) or "Unique" (special operation)? See §3.9 "Setting UPS Shutdown Operation" in the <i>LCD Panel Operating Manual</i> and check the setting value. The default setting is "1 Sec." (1 second).
	-BYPASS-	Green OUTPUT Blinking	<ul style="list-style-type: none"> • Is "UPS Operation at  OFF" in the LCD panel setting menu set to "BYPASS"? See §3.11 "Setting UPS Operation at  OFF" in the <i>LCD Panel Operating Manual</i> and check the setting value. The default setting is "OFF."
	Nothing is indicated.	Red ALARM Lit All other LEDs are off.	<ul style="list-style-type: none"> • The UPS has malfunctioned. Contact your supplier or SANYO DENKI.

UPS Status	LCD Indication	LED Status	Countermeasure
Power from the terminal block of the UPS stopped during operation.	-STANDBY-	Green INPUT Lit	<ul style="list-style-type: none"> Was  on the LCD panel or  on the UPS unit control panel pressed accidentally and set to "OFF"? Perform the correct procedure to set it to "ON."
	Byp Fuse Error	Red ALARM Lit Red WARNING Lit	<ul style="list-style-type: none"> Has the main breaker  tripped? The breaker may have been tripped by an overload or short circuit. Check the load capacity and whether there is a short circuit. If the load capacity is high, reduce the number of load devices connected to the terminal of the UPS. See §9.3 "Resetting Main Breaker." Are the output cables between the UPS units connected properly? See §6.3 "Connection Between Units," and connect the cables properly.
	Remote OFF	Green INPUT Lit	<ul style="list-style-type: none"> Is the remote OFF signal being input? See §5.4 "External Interfaces," and check whether the external control terminal is connected properly.
	EPO ON	Green INPUT Lit	<ul style="list-style-type: none"> Is the EPO signal being input? See §5.4 "External Interfaces," and check whether the external control terminal is connected properly.
An overload state occurs even though the connected load devices do not exceed the UPS rated capacity.	Over load	-	<ul style="list-style-type: none"> Are all of the output cables between the UPS units connected to the back of the UPS units properly? If there is a UPS unit that is not connected, the total capacity will be reduced by an amount equivalent to the capacity of that unit. See §6.3 "Connection Between Units," and connect it correctly.
Power from the terminal block of the UPS stopped during a power outage.	-	-	<ul style="list-style-type: none"> Have the batteries deteriorated? Check the time to replace the batteries. The battery service life will vary depending on the ambient temperature. Early battery replacement is recommended. Did a power outage occur within the last 12 hours? The remaining capacity of the batteries may be low. Sufficiently charge the UPS.
The buzzer sounded.	-	-	<ul style="list-style-type: none"> The alarm buzzer sounds when a state change, warning, or error occurs in the UPS. See §10 "Buzzer Sounds."
The buzzer does not sound.	-	-	<ul style="list-style-type: none"> Is "Buzzer" in the LCD panel setting menu set to "SILENT (stopped)." See §3.8 "Setting Buzzer Condition" in the <i>LCD Panel Operating Manual</i> and check the setting value.
Nothing is displayed on the LCD panel.	-	-	<ul style="list-style-type: none"> Is the UPS unit and LCD panel connected properly with the connection cable? See §6.2 "Installing UPS."
Cannot operate the LCD panel.	-	-	<ul style="list-style-type: none"> Is the UPS unit and LCD panel connected properly with the connection cable? See §6.2 "Installing UPS."
The LEDs on the UPS unit control panel do not light.	-	All: Off	<ul style="list-style-type: none"> Are all  set to "ON"? See §8.1 "UPS Startup" and check the correct operating procedure.
The LEDs on the UPS unit control panel of one UPS unit do not light.	-	All LEDs on one UPS unit are off.	<ul style="list-style-type: none"> Is  of the UPS unit for which the LEDs do not light set to "ON"? See §8.1 "UPS Startup" and check the correct operating procedure.
Cannot operate the UPS unit control panel.	-	Red ALARM Lit	<ul style="list-style-type: none"> The UPS has malfunctioned. Contact your supplier or SANYO DENKI.
Battery power supply continues. Power supply switches to battery power frequently.	Input Error Input Freq Err Input Vol Hi Input Vol Low	Green BACKUP Lit	<ul style="list-style-type: none"> Are all  set to "ON"? If they are set to "OFF," set them to "ON." (If  is set to the "OFF" during normal operation, the operation will become the same as for a utility power supply failure and the power supply will switch to battery power.) Check that the input voltage and input frequency are within the rated ranges. See §12.4 "Specifications."
Cannot perform a battery test.	-	-	<ul style="list-style-type: none"> A battery test cannot be performed when: <ol style="list-style-type: none"> The inverter is stopped. The bypass power supply is active. The battery operation is being performed A shutdown is being performed by, for example, a remote operation. The UPS has malfunctioned. During asynchronous operation "50Hz" or "60Hz" is set in §3.3 "Setting Frequency" in the <i>LCD Panel Operation Manual</i>.

UPS Status	LCD Indication	LED Status	Countermeasure
The UPS does not switch from bypass power supply to UPS power supply (inverter power supply).	-	-	<ul style="list-style-type: none"> When "Auto" is set in §3.3 "Setting frequency" in the <i>LCD Panel Operation Manual</i>; is the UPS being on asynchronous operation? The UPS cannot switch to UPS power supply from the bypass power supply during asynchronous operation. Check the UPS operation status. See §2 "Viewing UPS Information". When "50Hz" or "60Hz" is set; the UPS cannot switch to UPS power supply unless the input frequency is within the specified tracking range ($\pm 1\%$, $\pm 3\%$, or $\pm 5\%$) set in §3.2 "Setting Synchronous Frequency Tracking Range". Check the input frequency. Check that the forced bypass switch Forced Bypass is set to "Inverter." The forced bypass switch Forced Bypass is located inside the front panel of the UPS. Remove the front panel to check. See step 8 of §6.2 "Installing UPS." If the forced bypass switch is set to "Bypass," set it to "Inverter" and then press  again to switch to UPS power supply. If "Overload Recovery Operation" in the LCD panel setting menu is set to "Auto Ret BYP," the UPS switches to bypass power supply when there is an overload, and after the overload continues for a certain period of time, switches back to UPS power supply automatically. If the overload condition persists, the UPS switches to bypass power again, and this cycle is repeated. See §3.10 "Setting Overload Recovery Operation" in the <i>LCD Panel Operating Manual</i>. If "Overload Recovery Operation" in the LCD panel setting menu is set to "Stay on BYP," bypass power supply continues when the overload condition continues. When the overload condition is resolved, the UPS switches to UPS power supply. If the voltage of the utility power supply is low and the load current is at or below the overload detection threshold when the UPS switches to bypass power supply, the UPS continues to switch between UPS power supply and bypass power supply. See §3.10 "Setting Overload Recovery Operation" in the <i>LCD Panel Operating Manual</i>.
The device connected to the external interface section does not work.	-	-	<ul style="list-style-type: none"> Is the PDU interface cable at the back of the UPS connected properly? If this cable is not connected, the external interface section will not work. See §6.3 "Connection Between Units," and connect the PDU interface cable properly.
When using the power management software (option), serial communication fails.	-	-	<ul style="list-style-type: none"> Is "Interface" in the LCD panel setting menu set to "WS" (workstation)? See §3.5 "Setting PC Interface" in the <i>LCD Panel Operating Manual</i>. The default setting is "WS" (workstation). Is "Serial Baud Rate" in the LCD panel setting menu set properly? See §3.6 "Setting Baud Rate" in the <i>LCD Panel Operating Manual</i>. The default setting is "9600bps." Set the same setting value as that of the power management software. Is the communication cable connected properly? Connect the computer and UPS properly.
When the power recovers after the UPS has shut down due to battery exhaustion during a power outage, the UPS does not restart automatically.	-	-	<ul style="list-style-type: none"> Check the setting value of "UPS Operation Upon Power Recovery" in the LCD panel setting menu. If it is set to "STOP," the inverter will not start automatically. If this item is set to "BATT>30%," "BATT>50%," or "BATT>80%," the UPS will not start until the batteries are charged to the specified level. The default setting is "Auto." See §3.7 "Setting UPS Operation Upon Power Recovery" in the <i>LCD Panel Operating Manual</i>.
The UPS does not start automatically at the time set for scheduled operation in the power management software (option).	-	-	<ul style="list-style-type: none"> If "When power failure recovered, automatically start the UPS" of the "Configuring the UPS control conditions" items described in the <i>User Guide</i> of the Power Management Software is selected and a value between "10" to "90" is set for the specified value (%), the UPS will not start even at a scheduled start time if the batteries are not charged to the specified value. When scheduling operation for the UPS, set this specified value (%) to "0". For details, see "Setting the Shutdown Conditions" in the <i>User Guide</i> of the Power Management Software.
Red ALARM of one UPS unit lights.	-	Red ALARM of one UPS unit Lit.	<ul style="list-style-type: none"> The UPS for which "Red ALARM" is on has malfunctioned. Contact your supplier or SANYO DENKI. Normally operating UPS units will continue running. In such a case, power supply may be repeatedly switched between bypass power supply and inverter power supply. See the "The UPS does not switch from bypass power supply to UPS power supply." item in §11 "Troubleshooting."
Red ALARM lights.	-	Red ALARM Lit	<ul style="list-style-type: none"> When there is a power outage, "Red ALARM" lights if the battery is exhausted. In cases other than the above, the UPS has malfunctioned. Contact your supplier or SANYO DENKI.

Note

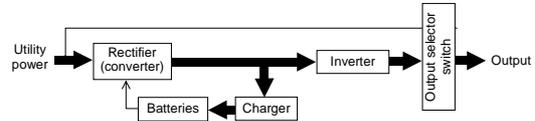
If the UPS does not operate normally even if you perform the countermeasures above, or if any other trouble occurs or you think there is a malfunction, contact your supplier or SANYO DENKI.

§12. UPS Characteristics

§12.1 Basic Operation

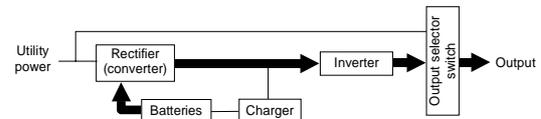
(1) When normal operation

During normal operation, the UPS converts AC power from the utility power source into DC power through the rectifier, and reconverts this DC power back into AC power through the inverter and supplies it to the load. The output power is stable AC power synchronized with the input power source. The batteries are kept continually charged and ready in case a problem (power outage or voltage drop) occurs with the utility supply.



(2) When failure of utility power

When a failure or a power outage occurs at the utility power source, the rectifier and charger stop operating while inverter operation continues, now using the batteries as a DC source to produce AC voltage, to ensure stable power supply to the load without even a momentary power dropout. At the same time, the buzzer sounds the battery operation alarm, and “Green INPUT” starts blinking.



(3) When battery voltage drops

When a failure or a power outage at the utility power source continues, the battery voltage drops to approximately 178 V or less, the buzzer sounds, and “Batt Vol Low” is displayed on the LCD screen.

(4) When recovery of utility power

When normal utility power is restored, rectifier and charger operations resume, automatically returning to the normal operation state described in §12.1 (1).

(5) Extended power outage

If a power outage persists and the battery voltage reaches the final discharge level of approximately 168 V, a protective circuit shuts off the inverter to prevent over-discharging of the batteries. When normal utility power recovers after the inverter has been stopped automatically, operation is automatically resumed*, returning to the normal operation state described in §12.1 (1).

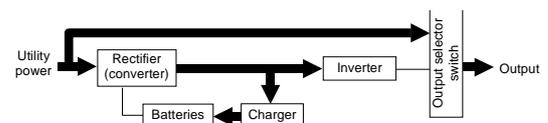
* When “UPS Operation Upon Power Recovery” in the LCD panel setting menu is set to “STOP”, inverter output remains stopped.

§12.2 Protective Functions

(1) Overload protection

If the UPS output is overloaded by the current capacity of the inverter being exceeded, such as when a computer system boots up, the output selector automatically switches the source of power from the inverter to bypass circuit without interruption. Once the overload state is resolved, the source of power is switched to the inverter, and operation returns to the normal operation state.

* When “Overload Recovery Operation” in the LCD panel setting menu is set to “Auto Ret BYP,” the UPS switches the source of power to the inverter without interruption when the overload is resolved, and operation returns to the normal operation state.

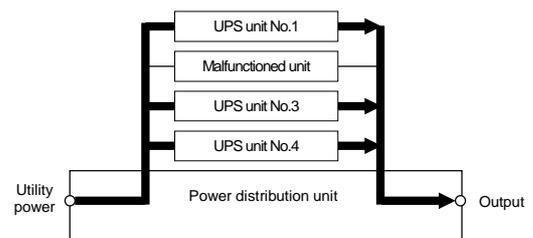


(2) UPS unit failure protection

If a failure occurs in the UPS unit, the unit in which the failure occurred is cut off automatically, and inverter power supply is continued from a normally operating units. At the same time, “Red WARNING” on the LCD panel lights and the “Red ALARM” LED on the UPS unit control panel of the malfunctioned UPS unit lights and the buzzer sounds. One of the following occurs depending on the size of the load current.

If the load current does not exceed the total current of the normally operating unit, inverter power supply is continued. If the load current exceeds the total current of the normally operating units, power supply is switched from inverter power to bypass operation.

The operation becomes the same as that indicated by the * mark in (1) of §12.2 above in accordance with the LCD panel setting menu.



Indication of the marks in the table as follows.

§12.3 Protective Function Table

The following table shows the functions and operations to protect the UPS.

- Lit LED: 
- Blinking LED: 
- Buzzer alarms: to
- Sending of transmission signal:

Item	Indicators/Indications of LCD Panel and UPS Unit Control Panel						Alarm Buzzer *2	Transfer Signal and Contact Signal Output						Protective Functions (UPS operations)	Notes
	Green INPUT	Green OUTPUT	Green BACKUP	Red WARNING	Red ALARM	LCD Indication*1		AC Input Error	Battery Voltage Drop	AC output	Inverter Output	Bypass Output	Device Error		
Preparation		-	-	-	-	-STANDBY- *****	-	-	-	-	-	-	-	Rectifier and charger operation	Receiving power
Normal			-	-	-	-ONLINE- *****	-	-	-	-	-	-	-	Inverter operation	Receiving power
Serious Failure	Normally Operating Unit			-		-	-SYS FAILURE- *****	-	-	-	-	-	-	Inverter operation	*3
	Malfunctioning Unit		-	-			-SYS FAILURE- *****	-	-	-	-	-	-	Stop inverter	
Overload			-	-	-	-BYPASS- *****	-	-	-	-	-	-	-	Bypass power supply	-
Forced Bypass			-	-	-	-BYPASS- *****	-	-	-	-	-	-	-	Bypass power supply	Manual switch to bypass operation
Input Over Voltage				-	-	-BATTERY- *****	-	-	-	-	-	-	-	Stop rectifier and charger. Continue inverter operation	Battery operation
Input Over Voltage (Prolonged, battery voltage drop)				-	-	-BATTERY- *****	-	-	-	-	-	-	-		
Power Outage				-	-	-BATTERY- *****	-	-	-	-	-	-	-		
Power Outage (Prolonged, battery voltage drop)				-	-	-BATTERY- *****	-	-	-	-	-	-	-		
Input Error (Frequency)				-	-	-BATTERY- *****	-	-	-	-	-	-	-		
Input Error (Prolonged, battery voltage drop)				-	-	-BATTERY- *****	-	-	-	-	-	-	-		
Complete Battery Discharge			-			-BYPASS- *****	-	-	-	-	-	-	-	Stop inverter Bypass power supply	-
Battery Voltage Error			-	-	-	-*****- Batt Vol Error	-	-	-	-	-	-	-	Inverter operation	Batteries not connected
Battery Remaining Service Life Warning			-	-	-	-*****- Batt Life Warn	-	-	-	-	-	-	-		-
Battery Service Life End			-	-	-	-*****- Batt Life End	-	-	-	-	-	-	-		-

*1. The "*****" indication on the LCD indicates the UPS status, etc.

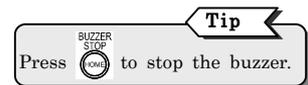
*2. Buzzer sound patterns:

- * ————— Continuous tone
- **.....**.....
- *****..... Continuous tone
- ****.....****.....
- ****.....****.....
- *****.....*****.....

See §10. "Buzzer Sounds" and perform the corresponding countermeasure.
If the UPS has malfunctioned, contact your supplier or SANYO DENKI.

*3. In the following cases, the UPS switches to bypass operation when a serious failure occurs.

- When only one UPS unit is connected.
- When all UPS units have malfunctioned.
- When a malfunction occurs and operation with a normally operating UPS unit will result in an operation overload state.



§12.4 Specifications

Item		Standard or Performance				Notes
Type		A11J502SA002U	A11J103SA002U	A11J153SA002U	A11J203SA002U	
Model		A11J502US002	A11J103US002	A11J153US002	A11J203US002	
Output capacity	N units setting	5 kVA/4.5 kW	10 kVA/9 kW	15 kVA/13.5 kW	20 kVA/17 kW	Selectable
	N+1 unit setting	-	5 kVA/4.5 kW	10 kVA/9kW	15 kVA/13.5 kW	Default: N units setting
Cooling system		Forced air cooling				
AC input	Input terminals	Field wiring type Terminal block				
	Number of phases	Single-phase, 2-wire				
	Voltage	200 V, 208 V, 220 V, 230 V, 240 V (Allowable variation range: -40% to +15%)				Selectable. Rated voltage same as output voltage. Default: 200 V *1
	Frequency	50 Hz or 60 Hz				Auto-detect, fixed setting selectable Default: auto-detect *2
	Power requirements	5.5 kVA	11 kVA	16.5 kVA	19.8 kVA	Max. capacity during battery recovery charging *3
	Input power factor	0.95 or more				During rated input voltage *4
Output terminals		Field wiring type Terminal block				
Number of phases		Single-phase, 2-wire				
Voltage		200 V, 208 V, 220 V, 230 V, 240 V				Default: 200 V
Voltage accuracy		Within rated voltage ±2%				
Frequency		50 Hz or 60 Hz				Same as input frequency (auto-select)
Frequency accuracy		Within rated accuracy ±1%, 3%, or 5%				1%, 3%, and 5% selectable *2 When free running operation, or frequency fixed setting: Within ±0.5%
Voltage waveform		Sine wave				
Distortion factor of voltage waveform		Linear load: 3% or less When rectifier load: 8% or less				During rated output
AC output	Transient Voltage variation	Rapid load change		0% 100% at transient or output switch		
		Power outage, recovery		Within rated voltage ±5 %		During rated output
		Rapid input voltage change		±10% variation		
	Load power factor	N units setting	0.9 (lag)		0.85 (lag)	Variation range 0.7 (lag) to 1.0
N+1 unit setting	0.9 (lag)		0.9 (lag)			
Overcurrent protection	N units setting	110% or more				Auto switching to bypass circuit
	N+1 unit setting	-	220% or more	165% or more	147% or more	With auto return function *5
Overload capability	Inverter	N units setting	110% / 118%		1-minute period / instantaneously	
	N+1 unit setting	-	220% / 236%	165% / 177%	147% / 157%	
Bypass	N units setting	200%/800%				30-second period / 2 cycles
	N+1 unit setting	-	400%/ 1600%	300%/1200%	267%/ 1067%	
Type		Small-sized valve regulated lead-acid battery				
Quantity		16pcs	32pcs	48pcs	64pcs	16 in serial for each UPS unit. (12 V/pcs)
Rated capacity		5 Ah / battery				20 hour-rate
Backup time		5 minutes when load power factor 0.8, 4 minutes when load power factor 0.9				At 25°C (77°F) ambient temperature, initial value *6
Expected service life		5 years				At 25°C (77°F) ambient temperature
Generated heat		350 W	730 W	1100 W	1500 W	During rated output
Input leakage current		12 mA or less	15 mA or less	20 mA or less	25 mA or less	
Operating environment		Ambient temperature: 0 to 40°C (32 to 104°F), relative humidity: 20 to 90%				No condensation *7
Acoustic noise		45 dB or less	50 dB or less	50 dB or less	50 dB or less	1 m (40 inches) from front of UPS, A characteristics
Safety standard		UL1778-4th/C22.2 No.107.3-05-2nd, CE: IEC62040-1:2008				
Emission		EN62040-2 C3:2006, EN55022:2006 Class-A FCC Part15 Sub partB Class-A				
Immunity		EN62040-2:2006, EN55024:1998/A1:2001/A2:2003				

*1. The allowable voltage range of AC input is as follows.

Condition	Allowable voltage range
• When load factor is less than 70%	-40% ~ +15%
• When load factor exceeds 70%	-20% ~ +15%
• At UPS start up	-20% ~ +15%

When load factor is less than 70%, voltage error detection point is -40%, voltage recovery detection point is -20%.

*2. When the auto-detect setting is set, you can select a synchronous frequency tracking range from ±1%, ±3%, and ±5%. (at shipment: ±3%). And the allowable range for the input frequency is ±8% on the auto-detect setting. When the fixed setting is set, the output frequency is fixed to the set frequency (50 Hz or 60 Hz) regardless of the input frequency. And the allowable range for the input frequency is 40 Hz to 120 Hz on the fixed setting. When the input frequency recovers from being outside the allowable range, the range is ±8% regardless of the setting. Also, even when either setting is set, the inverter will not start if the input frequency is not within the range of the values (±1%, ±3%, or ±5%) set for the synchronous frequency tracking range.

*3. When N+1 unit is set, the value becomes as shown in the table below.

Model	A11J502	A11J103	A11J153	A11J203
Load capacity	-	5 kVA	10 kVA	15 kVA
Required capacity	-	6.2 kVA or less	11.7 kVA or less	17.2 kVA or less

*4. When the distortion factor of the input voltage waveform is less than 1%.

*5. The inverter is capable of operation synchronized with AC input frequency and switchover operation without interruption provided that the AC input frequency is within the rated frequency range, and the AC input voltage is within the rated voltage range.

*6. Some of the specifications for a UPS with long backup times differ from the specifications listed in the table above. See the extension battery specifications instruction manual.

*7. The UPS contains batteries. The battery service life will be foreshortened if the UPS is used in an environment where the ambient temperature exceeds 30°C (86°F).

§13. Warranty

Warranty for use in Japan: 1 year

Warranty for use Overseas: 1 year

Warranty for use in North America: 3 years

Valid only when the UPS is purchased from a vendor recognized by Sanyo Denki.

1. In the above areas, this product is warranted for the specified periods against electrical failures due to materials or workmanship.
2. Free repair or replacement by a product with equivalent functions will be made when it is determined that failure has occurred because of defects in materials or workmanship.
3. This warranty is void in the event of any modification or change to the product supplied by Sanyo Denki.
4. This warranty is void in the event of any improper use of the product supplied by Sanyo Denki, or failure to use the product as specified in this Instruction Manual.
5. This warranty does not apply when the product is used aboard a ship or in another area subject to vibrations.
6. This warranty does not apply when the product is operated under extraordinary conditions, for example periodic complete discharge of the batteries.
7. This warranty is void in the event that the product supplied by Sanyo Denki is installed in an inappropriate location.
8. This warranty does not apply to failures due to accidents, improper use, or use for other than the product's intended use.
9. This warranty does not apply to defects or damages arising from fire, earthquake, storm or flood disaster, lightning or other natural disasters including pollution, salt disaster, gas disaster (chloride gas), non-standard voltage or incorrect power sources other than those specified.
10. This warranty does not apply to defects or damages arising from mishandling, such as during transportation, relocation or dropping of the UPS by the customer after purchase.
11. Sanyo Denki reserves the right to determine whether damage to a load device connected to this product is due to faulty operation by this product. (In the event of any such claim, the affected load device must be sent to Sanyo Denki for inspection.)
12. Warranties for devices other than the product supplied by Sanyo Denki shall be the warranties provided by the manufacturers of those devices.
13. Sanyo Denki provides no warranty for products made by other manufacturers used or composed in the products manufactured by Sanyo Denki.
14. This warranty applies to the product specified by Sanyo Denki. It does not apply to any other device.
15. Sanyo Denki disclaims all responsibility for damage to load device software, loss of data, lost profits, and lost opportunities.
16. This warranty does not apply to medical or industrial devices connected to this product.