




OPERATING INSTRUCTIONS

POWER SUPPLY MANAGER

VX-3000DS CE
VX-3000DS CE-GB

 1134
TOA Electronics Europe GmbH Suederstrasse 282, 20537 Hamburg, Germany 1134-CPR-137 14 DoP 14-001
EN 54-4: 1997/A1: 2002 + A2: 2006 VX-3000DS CE/CE-GB Power supply equipment for fire detection and fire alarm systems for buildings

Thank you for purchasing TOA's Power Supply Manager.

Please carefully follow the instructions in this manual to ensure long, trouble-free use of your equipment.

TABLE OF CONTENTS

1. SAFETY PRECAUTIONS	3
2. FEATURES	4
3. NOMENCLATURE AND FUNCTIONS	5
Front	5
Front (with the front panel removed)	6
Rear	7
4. INSTALLATION	8
4.1. Installing the VX-3000DS in the Cabinet Rack	8
4.2. Battery Installation	8
4.3. Affixing Declaration of Compliance (EN 54-4 Standard)	12
5. CONNECTIONS	13
5.1. Connecting the VX-3000DS to VX-2000 System	13
5.2. Connecting the VX-3000DS to SX-2000 System	14
5.3. Connecting the VX-3000DS to VM-3000 System	17
5.4. Connecting the VX-3000DS to VX-3000 System	21
6. CABLE USAGE TABLE	23
7. SWITCHING OFF SYSTEM POWER (DC)	24
8. BLOCK DIAGRAM	25
9. APPENDIX:	26
10. SPECIFICATIONS	31
Accessories	31

1. SAFETY PRECAUTIONS

- Before installation or use, be sure to carefully read all the instructions in this section for correct and safe operation.
- Be sure to follow all the precautionary instructions in this section, which contain important warnings and/or cautions regarding safety.
- After reading, keep this manual handy for future reference.

Safety Symbol and Message Conventions

Safety symbols and messages described below are used in this manual to prevent bodily injury and property damage which could result from mishandling. Before operating your product, read this manual first and understand the safety symbols and messages so you are thoroughly aware of the potential safety hazards.



WARNING

Indicates a potentially hazardous situation which, if mishandled, could result in death or serious personal injury.



CAUTION

Indicates a potentially hazardous situation which, if mishandled, could result in moderate or minor personal injury, and/or property damage.



WARNING

When Installing the Unit

- Do not expose the unit to rain or an environment where it may be splashed by water or other liquids, as doing so may result in fire or electric shock.
- Use the unit only with the voltage specified on the unit. Using a voltage higher than that which is specified may result in fire or electric shock.
- Do not cut, kink, otherwise damage nor modify the power supply cord. In addition, avoid using the power cord in close proximity to heaters, and never place heavy objects -- including the unit itself -- on the power cord, as doing so may result in fire or electric shock.
- Do not place cups, bowls, or other containers of liquid or metallic objects on top of the unit. If they accidentally spill into the unit, this may cause a fire or electric shock.
- Do not insert nor drop metallic objects or flammable materials in the ventilation slots of the unit's cover as this may result in fire or electric shock.
- Do not touch a power supply plug during thunder and lightning, as this may result in electric shock.
- When replacing the AC or DC fuse, be sure to use the proper one among the following supplied fuses: AC fuse T8A H, AC fuse T6.3A L, and Blade fuse 35 A. Using any other fuse than supplied may cause fire or electric shock.
- Handle or use the batteries properly. Doing otherwise may cause leakage or explosion of the batteries, resulting in a fire, personal injury, damage to peripheral equipment, or contamination of environment.

When the Unit is in Use

- Should the following irregularity be found during use, immediately remove the AC power plugs (AC power cords), disconnect the battery, and contact your nearest TOA dealer. Make no further attempt to operate the unit in this condition as this may cause fire or electric shock.
 - If you detect smoke or a strange smell coming from the unit.
 - If water or any metallic object gets into the unit
 - If the unit falls, or the unit case breaks
 - If the power supply cord is damaged (exposure of the core, disconnection, etc.)
 - If it is malfunctioning (no tone sounds.)
- To prevent a fire or electric shock, never open the unit case nor modify the unit. Refer all servicing to qualified service personnel.



CAUTION

When Installing the Unit

- Never plug in nor remove the power supply plug with wet hands, as doing so may cause electric shock.
- When unplugging the power supply cord, be sure to grasp the power supply plug; never pull on the cord itself. Operating the unit with a damaged power supply cord may cause a fire or electric shock.
- Do not block the ventilation slots in the unit's cover. Doing so may cause heat to build up inside the unit and result in fire.

- When connecting multiple appliances to a single power socket through a multi-outlet power strip, a total current consumption of the appliances must not exceed the allowable current capacity of the power socket.
Failure to observe this instruction may result in a fire or electric shock.
- When 2 or more AC power cords are connected to a multi-outlet power strip, never remove the power strip from a power source.
- Avoid installing the unit in humid or dusty locations, in locations exposed to the direct sunlight, near the heaters, or in locations generating sooty smoke or steam as doing otherwise may result in fire or electric shock.
- System units (except remote microphones) are designed exclusively to be mounted in an equipment rack. Be sure observe the following instructions when rack-mounting the unit. Failure to do so may cause a fire or personal injury.
 - Install the equipment rack on a stable, hard floor. Fix it with anchor bolts or take other arrangements to prevent it from falling down.
 - The supplied rack-mounting screws can be used for the TOA equipment rack only. Do not use them for other racks.
- Note correct polarity (positive and negative orientation) when connecting the power supply cord. Reversed polarity connections will cause damage to the system.

When the Unit is in Use

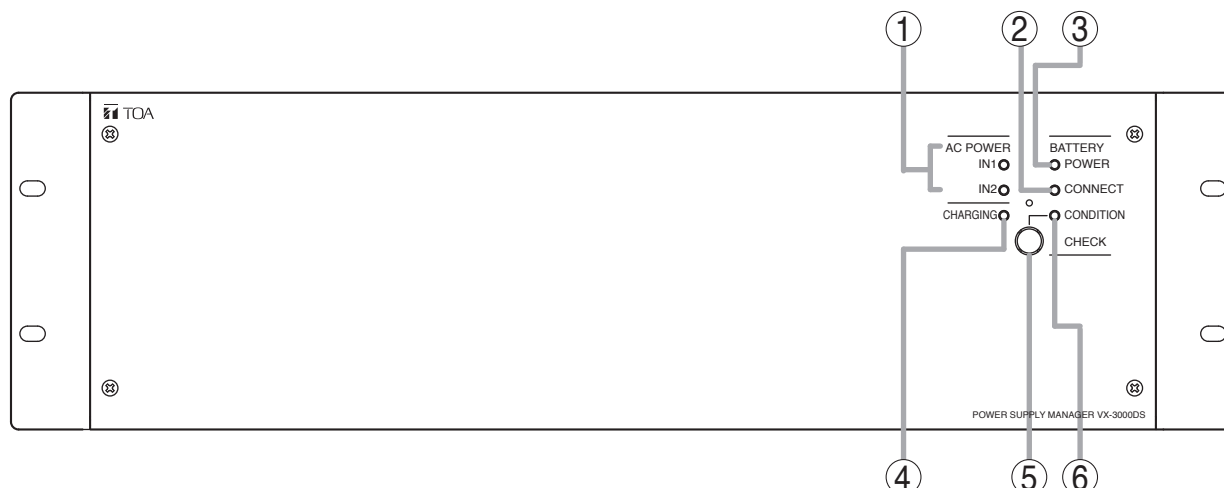
- Use the specified power supply unit for the system. Note that the use of other power supply unit may cause a fire.
- Make sure to observe the following handling precautions so that a fire or personal injury does not result from leakage or explosion of the battery.
 - Do not short, disassemble, heat nor put the battery into a fire.
 - Avoid using both new and old batteries together.
 - Never charge batteries of the type which are not rechargeable.
 - Do not solder a battery directly.
 - Be sure to use the specified type of batteries.
 - Note correct polarity (positive and negative orientation) when connecting a battery to the unit.
 - Avoid locations exposed to the direct sunlight, high temperature and high humidity when storing batteries.

2. FEATURES

- Internal dual power supply supplies DC power to individual components.
- Automatically switches to the backup power supply when the AC Mains power supply is interrupted.
- Detects charging circuitry or battery failures, and transmits failure signals to the DS LINK of the TOA Voice Evacuation Systems (VX-2000, SX-2000, and VM-3000).
- Keeps a 2 x 12 V sealed lead-acid battery charged while maintaining temperature compensation for the charging voltage.
- Automatically disconnects the battery if its voltage reaches a discharge final level.

3. NOMENCLATURE AND FUNCTIONS

[Front]



1. Power indicators [AC POWER IN1, IN2]

Light green when AC power is supplied through the AC inlets (18).

2. Battery connection indicator [BATTERY CONNECT]

Lights green when the battery is connected.

3. Battery indicator [BATTERY POWER]

Indicates the state of battery usage. Lights green when the AC power supply is interrupted and switched over to the backup batteries.

4. Charging indicator [CHARGING]

Indicates battery charging status. Flashes green while charging, and continuously lights green after charging completion.

5. Battery check button [BATTERY CHECK]

Pressing this button permits the internal resistance measurement of the backup batteries and also the operation check of the built-in 2 fans.

The Battery check indicator goes off if the measured resistance exceeds the specified value.

In automatic mode, the unit performs battery check every 3 and a half hours.

When the DS LINK is connected to the VX-2000 system, SX-2000 system, or VM-3000 system, the resistance measurement is activated by the equipment, not by the unit itself.

Note

Battery check cannot function for 1 minute during of which Battery indicator (3) flashes twice, pause, and then repeats after it has been activated once. In this case, wait a few minutes, then reactivate it.

6. Battery check indicator [BATTERY CONDITION]

In the AC operated system, the internal resistance value of the battery is measured automatically or manually to check whether the battery is faulty. The Battery check indicator indicates the result.

• Before measurement:

Flashes green at 2-second intervals.

• During measurement:

Flashes green at 1-second intervals.

• Normal: Lights green.

• Abnormal: Remains unlit.

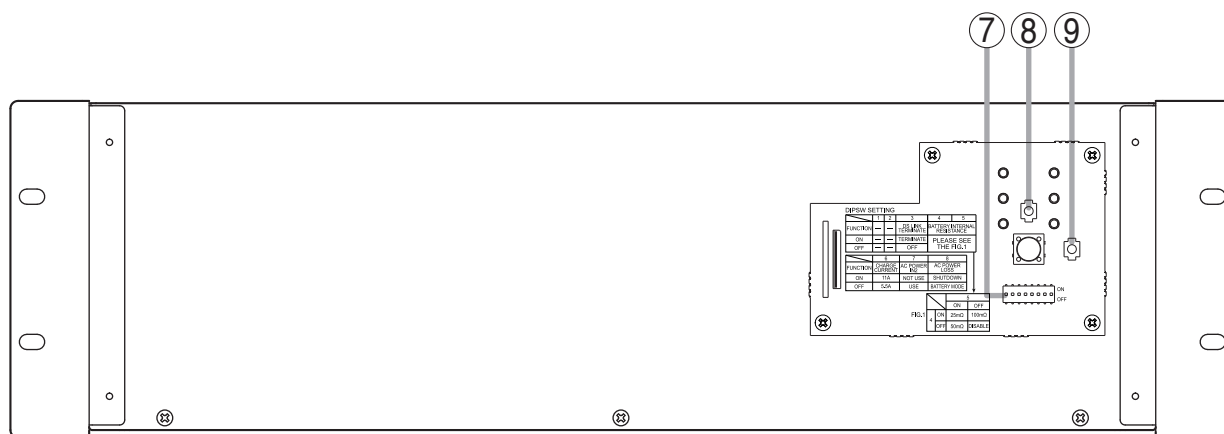
In the battery-operated system, the battery voltage is constantly monitored and its level is indicated by the indicator as shown below without pressing the Battery check button.

• Lights green: 25 V or more

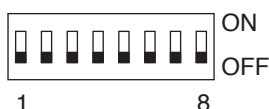
• Flashes green: 20 – 25 V

• OFF: 20 V or less

[Front (with the front panel removed)]



7. DIP switch



- Switches 1 and 2 are not used.
Be sure to leave both switches OFF.
- Switches 3 – 8 are factory-preset as shown below.
Switches 3 and 5: ON
Switches 4 and 6 – 8: OFF

Each switch function is described as follows.

Switch 3

Used for terminating the connection.
Set to ON when no other VX-3000DS unit is connected or when this unit is the last one of connected units.

Switches 4 and 5

Set the upper limit value of the internal battery resistance and battery connection cable resistance to be monitored for fault detection.
Setting switch combination of 4 and 5 is as follows.

		5	
		ON	OFF
4	ON	25 mΩ ^{*1}	100 mΩ
	OFF	50 mΩ	DISABLE

^{*1} Settings compliant with EN 54-4.

Switch 6

Sets the battery charging current.

ON: 11 A (100 to 200 Ah)

OFF^{*2}: 5.5 A (under 100 Ah)

^{*2} Settings compliant with EN 54-4.

[Fault indication]

If any of the following indicators on the front panel remains unlit, the unit is judged failed. In such cases, remove the cause of the failure, and restore the unit to normal operation.

- Power indicators [AC POWER IN1, IN2]
- Battery connection indicator [BATTERY CONNECT]
- Charging indicator [CHARGING]
- Battery check indicator [BATTERY CONDITION]

Note

Even if any of these indicators flashes, this does not indicate malfunction.

Switch 7

Sets whether the failure detection function is used for the AC Power IN2.

ON: Failure detection function disabled.

OFF^{*3}: Failure detection function enabled.

^{*3} Settings compliant with EN 54-4.

Set to ON when using the AC Power IN1 only, and set to OFF when using both AC Power IN1 and IN2.

Note

The AC inlet IN2 works irrespective of Switch 7 setting as long as power is applied to it. Therefore, be sure to set Switch 7 to OFF (enabling the failure detection function) whenever IN2 is used.

Switch 8

Places the unit in AC operation mode or battery mode.

ON: All power outputs are shut down when AC power fails even if backup batteries are connected. (AC operation mode).

OFF: Battery is used as backup power supply when AC power fails. (Battery mode)

Be sure to set to OFF in normal operation.

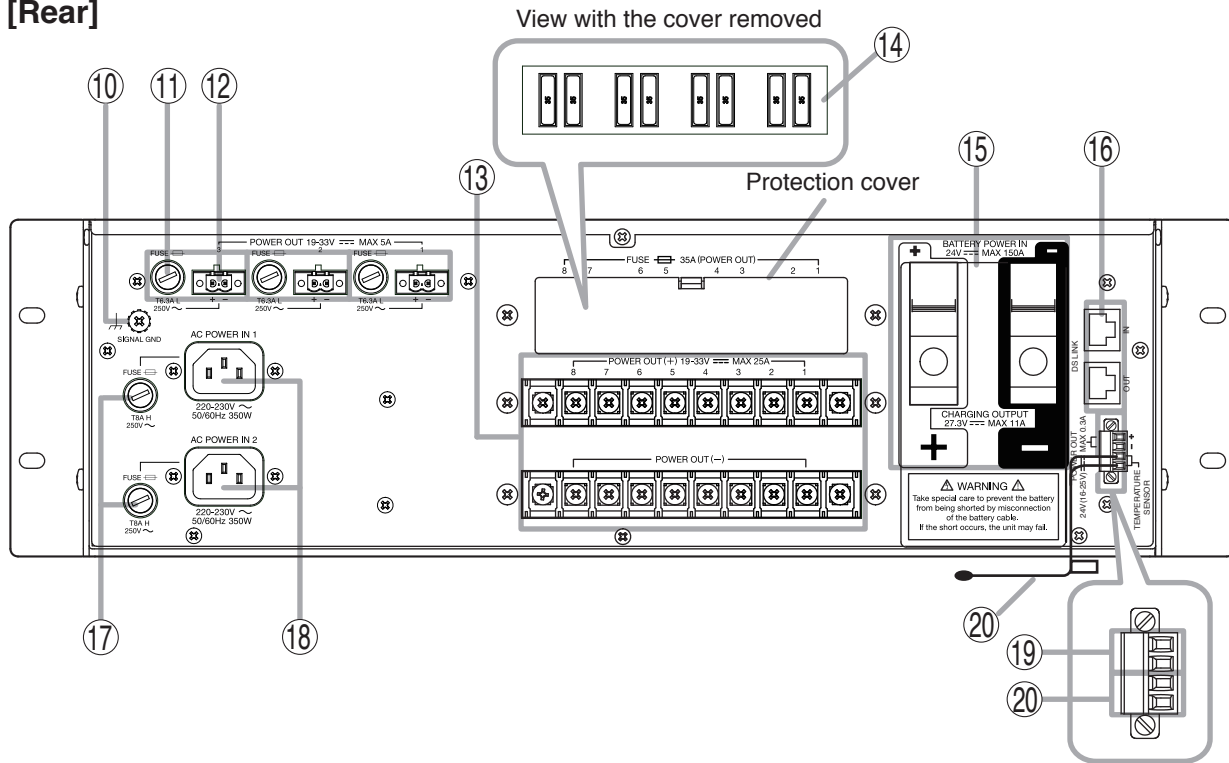
8. Shutdown button

Pressing this button forcibly shuts down this unit irrespective of Switch 8 ON/OFF setting of the DIP switch (7).

9. Reset button

Pressing this button resets this unit.

[Rear]



10. Functional earth terminal [SIGNAL GND]

Hum noise may be generated when external equipment is connected to the unit. Connecting this terminal to the functional earth terminal of the external equipment may reduce the hum noise.

Note: This terminal is not for protective earth.

11. Fuse holders

Requires an AC fuse.
Ratings: 250 V, T6.3A L

12. DC output terminals

[POWER OUT 19-33V MAX 5A]

DC 33 V max., 5 A max.
Supply DC power to the SX-2000SM or VX-2000 or other DC-operated devices except power amplifiers.

13. DC output terminal

[POWER OUT 19-33V MAX 25A]

DC 33 V max., 25 A max.
Supplies DC power to power amplifiers or other DC-operated devices.

14. Fuses

Provided in each DC output.
Type and rating: Blade-Type Fuse 35 A
Remove the protection cover when replacing the fuse.

15. Battery connection terminal

[BATTERY POWER IN]

Connects to the backup sealed lead-acid battery.
Recommended battery:

- 2 x Panasonic LC-X1265PG/APG
- 2 x Panasonic LC-XA12100P
- 2 x Panasonic LC-XB12100P*
- 2 x Yuasa NP65-12
- 2 x Yuasa NPL100-12

* Compliant with EN54-4

16. Control connectors [DS LINK IN, OUT]

- DS LINK IN connector
Connects to DS LINK connector of the VX-2000

system, SX-2000 system, or VM-3000 system.

- DS LINK OUT connector
Connects to DS LINK IN connector of a daisy-chained unit.

Note: This connection is required only when 2 to 4 units are connected to one DS LINK connector.

17. Fuse holders

The specified AC fuses are incorporated.
Ratings: 250 V, T8A H

18. AC inlets (AC POWER IN1, IN2)

Connect to power source of 220 - 230 V AC, 50/60 Hz using the supplied power cords.
Connect both AC POWER IN 1 and AC POWER IN 2 to AC mains power outlet from single circuit breaker line.

Allowable power capacity is 1800 W each, 3600 W in total. Power applied to both inlets is sent to individual DC power supply circuits, then finally joined together, operating entire circuit inside the unit.

19. DC output terminal

[POWER OUT 24V(16-25V) MAX 0.3A]

DC 24 V max., 0.3 A max.
Supplies DC power to the DC-operated devices except power amplifiers.

20. Temperature sensor connection terminal

[TEMPERATURE SENSOR]

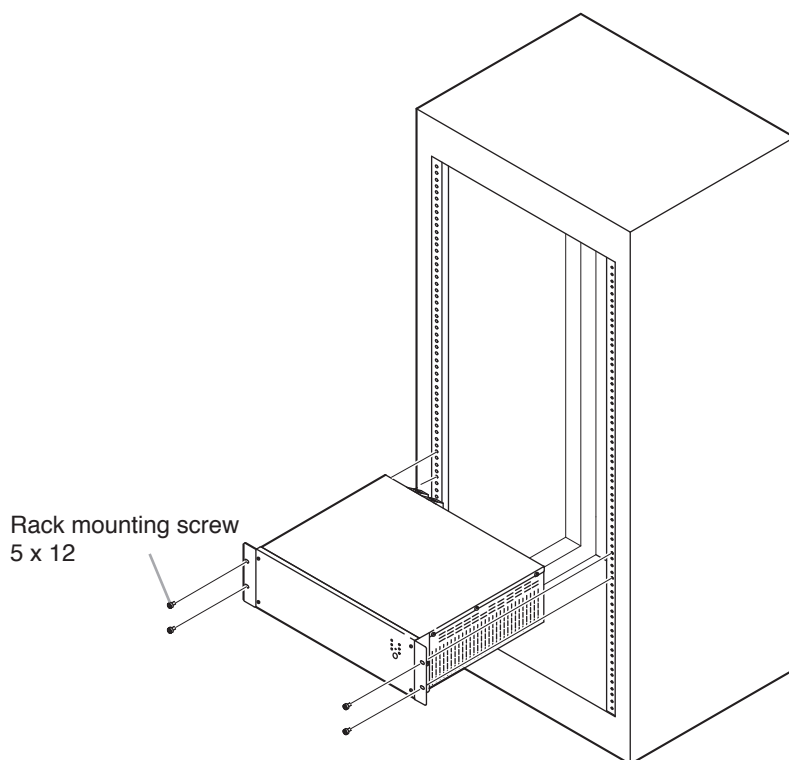
Detects the ambient temperature of the backup battery, and performs temperature compensation for the charging voltage. For the installation instructions, refer to p. 11.

The temperature sensor has a serial number label attached to it.

When connecting the temperature sensor to this terminal, confirm the serial number matches that of the VX-3000DS.

4. INSTALLATION

4.1. Installing the VX-3000DS in the Cabinet Rack



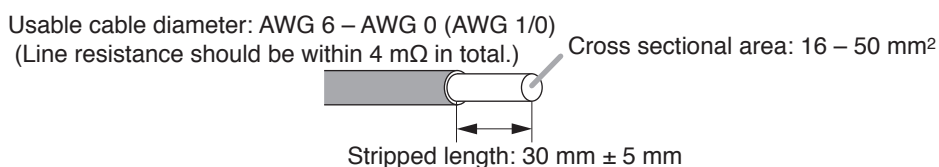
4.2. Battery Installation

WARNING

- Take special care to prevent the battery from being shorted by misconnection of the battery cable. If the short occurs, the unit may fail. Follow the instructions in this section for safe and secure connection.
- Be sure to switch off the system power before battery connection. For the procedure, refer to p. 24 “SWITCHING OFF SYSTEM POWER (DC)”
- After completing the battery connection, be sure to attach a terminal cover onto each battery terminal to prevent shorts between positive and negative terminals.

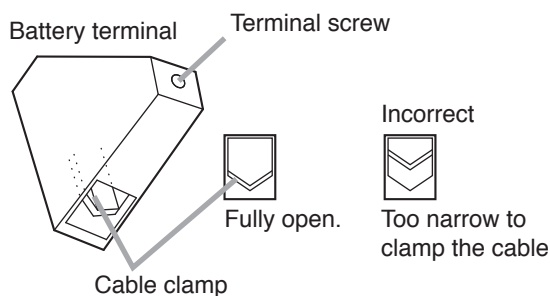
[Cable end treatment]

To secure the connection between the battery terminal and cable, be sure to use the cable of specified diameter and treat its end as follows.



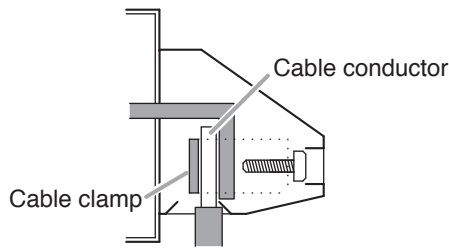
[Cautions on cable connection to the battery terminal]

- Before connecting the battery cable to the battery terminal, be sure to fully open the cable clamp by turning the terminal screw counterclockwise.



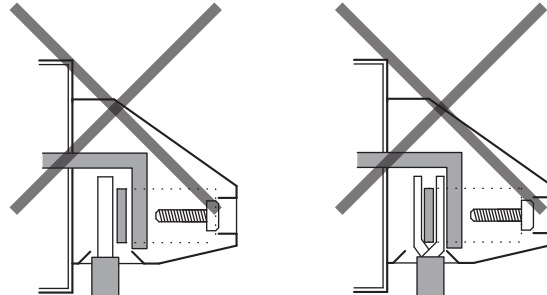
- Insert the battery cable into the correct position in the battery terminal referring to the terminal's cross sectional diagrams below.

Correct position of the cable insertion



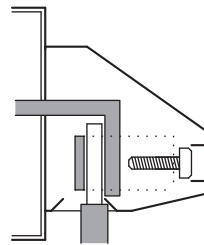
Incorrect position of the cable insertion

Wrong insertion position of the cable or a forked cable insertion causes poor contact or insufficient connection tightness, making the cable come off to possibly cause short-circuit accident.

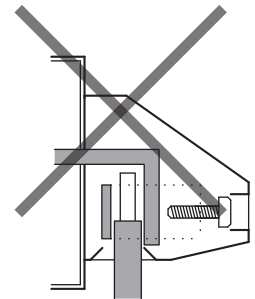


- Strip the cable end long enough ($30\text{ mm} \pm 5\text{ mm}$) to be fully clamped. Otherwise, its outer jacket prevents the cable conductor from being tightly secured, causing poor contact.

Correct



Incorrect



[Connecting the battery]



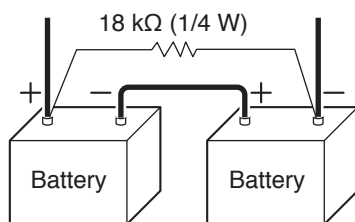
CAUTION

Note correct polarity (positive and negative orientation) when connecting the power supply cord. Reversed polarity connections will cause damage to the system.

Notes

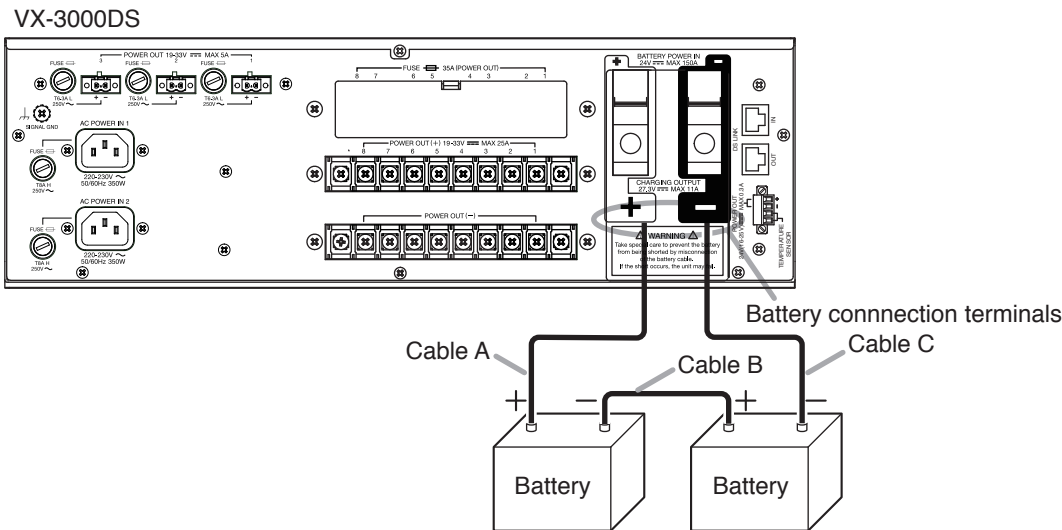
To avoid battery failure and charger failure, take care of the following points.

- If batteries not recommended by the manufacturer are used and a charger failure occurs, connect a resistor of $18\text{ k}\Omega$ ($1/4\text{ W}$) parallel to the batteries.



- Use the specified type of batteries and capacity.
- When batteries are connected together in a series-parallel arrangement, the inter-connecting cables must be of equal length and resistance to insure equalization of the load.
- Do not mix batteries with different capacity, new and old batteries, or batteries of different manufacturers. Doing so may cause different characteristic values among batteries, possibly resulting in damage to the batteries themselves or the connected equipment.

- Use the battery connection cables as short in length and as large in diameter as possible.



AWG	Cable cross sectional area	Length (2 mΩ)	Example of wire length	
			Cable A, Cable C	Cable B
AWG 6	16 mm ²	180 cm	80 cm each	20 cm
AWG 4	25 mm ²	280 cm	130 cm each	20 cm
AWG 2	35 mm ²	400 cm	190 cm each	20 cm
AWG 0 (AWG 1/0)	50 mm ²	570 cm	275 cm each	20 cm

- Total resistance of the battery connection path should be less than 4 mΩ, which includes resistance of all of wire, terminal, fuse, and terminal points.

For reference, refer to each resistance as follows.

Resistance of terminal, fuse (if provided): 1 – 2 mΩ

Resistance of terminal point: 0.1 – 0.5 mΩ

- Tighten the bolts, nuts, and screws of the unit's battery connection terminals and battery terminals with the torque as shown below.

VX-3000DS' Battery connection terminals	6 – 8 Nm
Battery terminals	4.1 – 5.6 Nm (M6)
	8.2 – 5.6 Nm (M8)

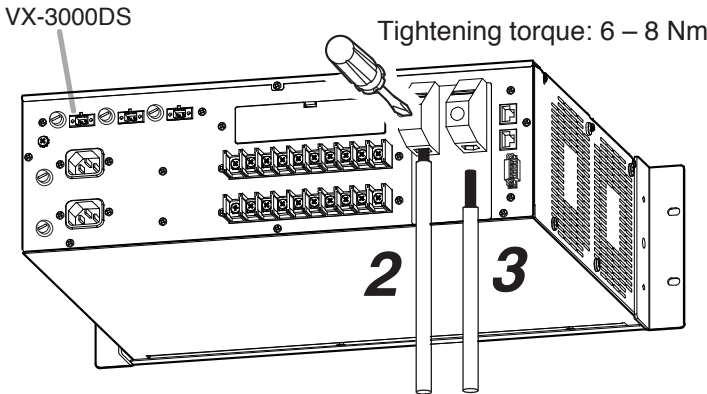
Step 1. Allow more than 10 seconds to elapse after removing the power cords from the VX-3000DS' rear-mounted AC inlets (IN1 and IN2).

Step 2. Insert the positive battery cable into the VX-3000DS' rear-mounted BATTERY POWER IN positive terminal from the bottom side of the connector, then tighten the terminal screw with a flat screwdriver.

Note

Never connect the negative cable first to avoid battery short-circuit that occurs if the positive cable should contact the unit chassis or equipment rack.

Step 3. Connect the negative battery cable to the negative terminal in the same manner as **Step 2**.



[Disconnecting the battery]

Step 1. Confirm that battery power is not in use by means of the VX-3000DS' front-mounted BATTERY POWER LED, which is unlit in this case.

Step 2. Loosen the VX-3000DS' BATTERY POWER IN negative terminal screw, then pull out the negative battery cable.

Notes

- Never remove the positive cable first to avoid battery short-circuit that occurs if the positive cable should contact the unit chassis or equipment rack.
- Insulate the exposed end of the removed cable with insulating tape to avoid shorting to the other cable.

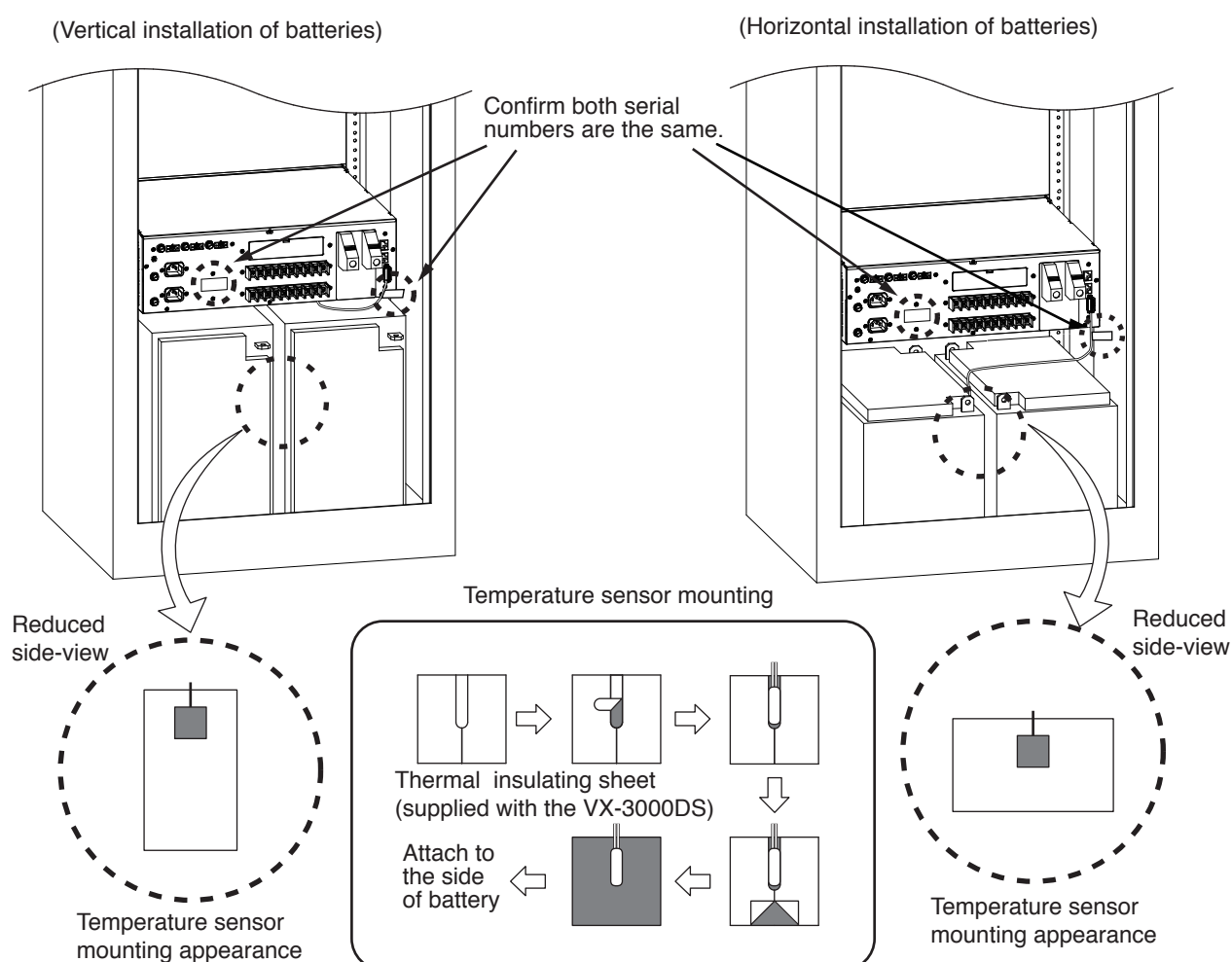
Step 3. Remove the positive battery cable from the positive terminal in the same manner as **Step 2**.

Note

Insulate the exposed end of removed cable with insulating tape to avoid shorting to the other cable.

[Installing a temperature sensor]

The temperature sensor located on the VX-3000DS' rear panel is designed to compensate for temperature changes when charging the battery. It should be mounted on the side of one battery in between 2 batteries using the supplied thermal insulating sheet to avoid ambient temperature change, thereby maintaining the temperature of the temperature sensor relatively constant.



Step 1. Clean the exterior surface of the battery using a soft damp cloth.

Note: Avoid using chemical cleaners and solvents that may cause the battery cases to crack or leak.

Step 2. Follow the procedure shown above to attach the temperature sensor to the battery.

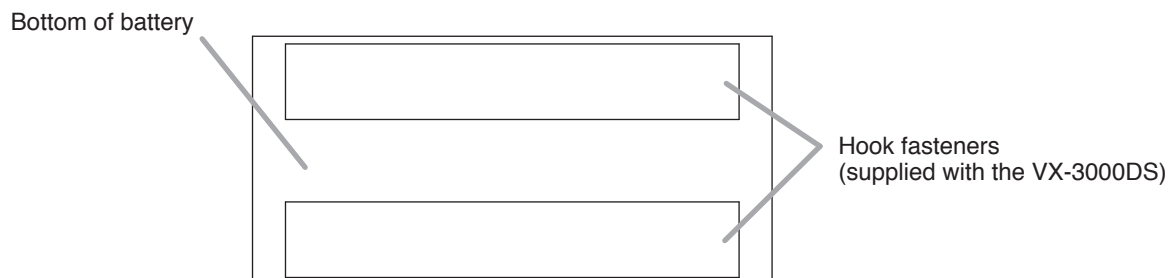
Note: The thermal insulating sheet is hard to remove after attached.

For details about battery installation, refer to "9. APPENDIX: Recommendations to the Power Supply Installation" on p. 26.

[Fixing the battery]

To comply with EN54-4, fix the battery at the bottom plate surface of the rack as shown below. Attach hook fasteners to the bottom or side surface of each battery, and loop fasteners to the bottom plate surface of the rack.

Example when the hook fasteners are attached to the battery's bottom surface

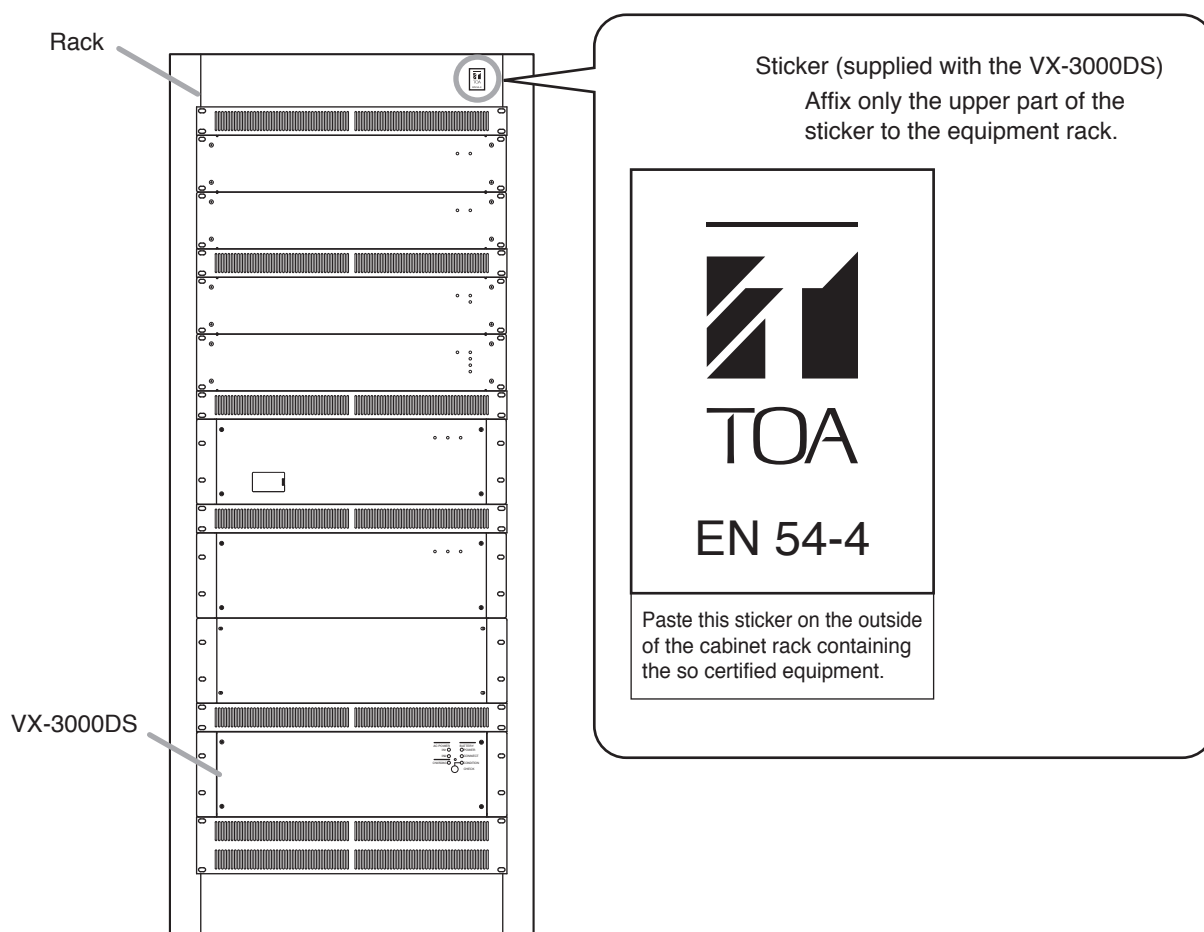


When replacing the batteries, 4 each of fastener hooks and loops, and a thermal insulating sheet listed below are also required. Consult your nearest TOA dealer on how you can obtain them.

Part code	Part name
135-01-075-2	VX-2000DS FASTENER HOOK (A)
135-01-076-3	VX-2000DS FASTENER LOOP (B)
131-27-891-2	VX-2000DS THERMAL INSULATING SHEET

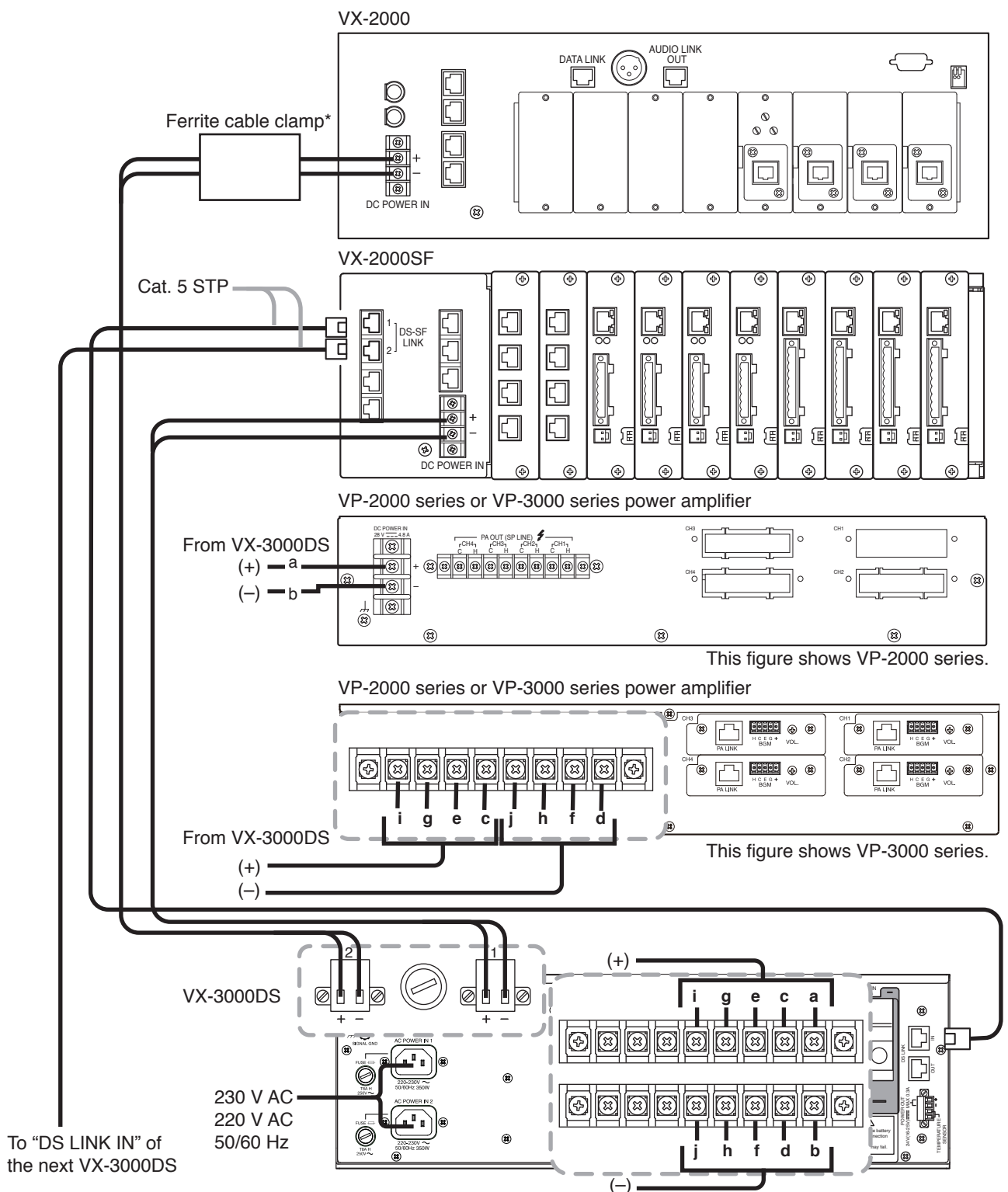
4.3. Affixing Declaration of Compliance (EN 54-4 Standard)

To declare that the VX-3000DS complies with EN 54-4, affix the sticker supplied with the VX-3000DS visible to the front panel of the equipment (e.g. at the upper right side as shown below).



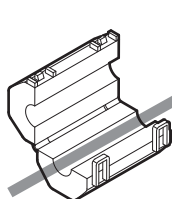
5. CONNECTIONS

5.1. Connecting the VX-3000DS to VX-2000 System



* Ferrite Cable Clamp Attachment
(For VX-2000 only)

To reduce electromagnetic noise, place the supplied ferrite cable clamp over the DC power cable at a position within 20 cm from the VX-2000's DC POWER IN terminal.



Note

The maximum number of the devices connected to and the output power supplied from one VX-3000DS must be within the specified limit shown below. Failure to observe this instruction may cause damage to the unit.

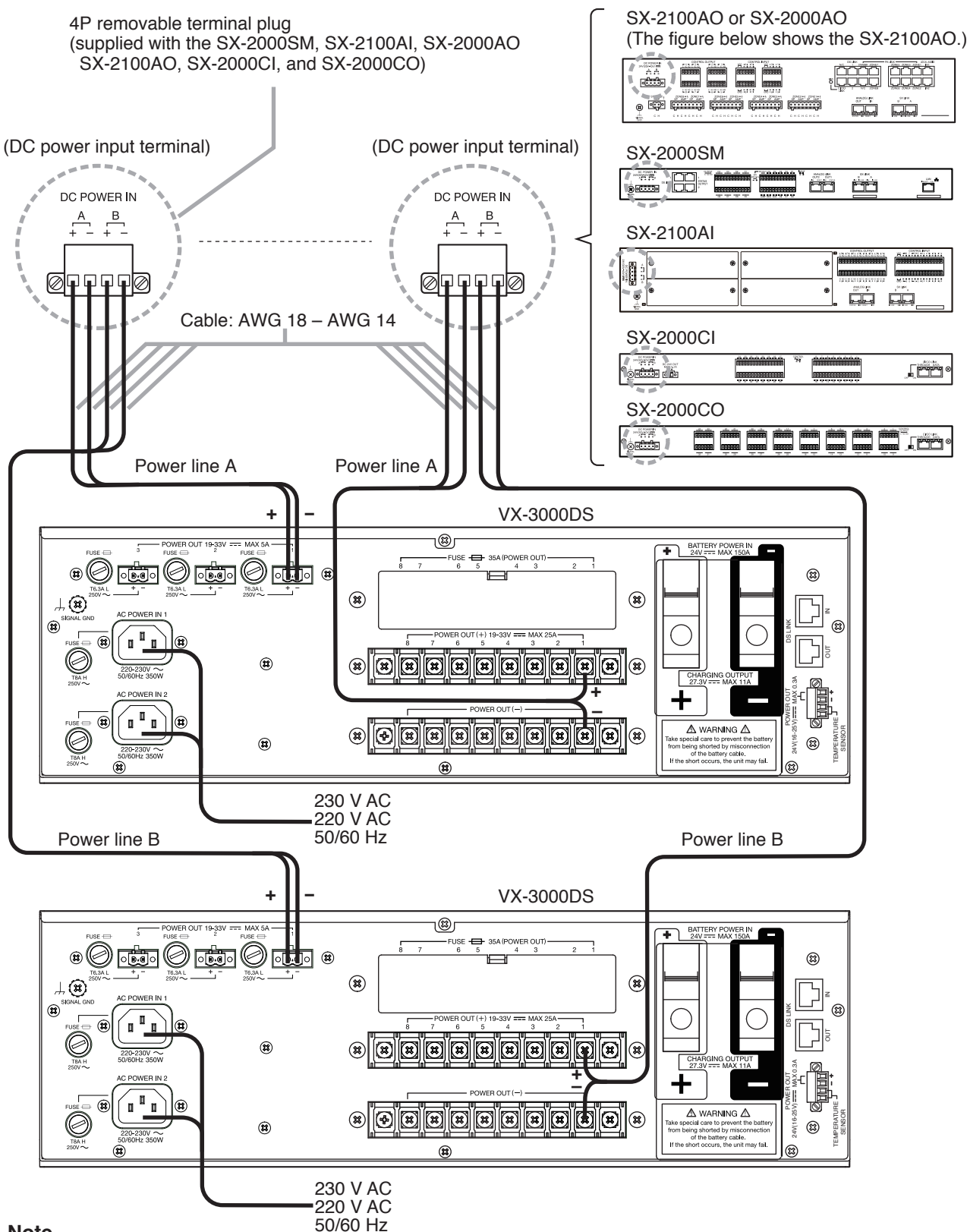
Model of the connected amplifier	Total number of the connected devices	Total output power
VP-3154, VP-3304, VP-3504	Max. 8 channels	2000 W or less
VP-2064, VP-2122, VP-2241, VP-2421	Max. 8 units	1440 W or less

5.2. Connecting the VX-3000DS to SX-2000 System

5.2.1 When using a redundant power system*

In this connection example, 2 power supply units are used. Even if one of the 2 units fails or its power supply line is broken, power is still supplied from the other unit, preventing the system from going down.

* A method of connecting separate power sources to each power input or connecting the commercial power supply and backup power supply separately to each power input to prevent the system from going down when a cable is broken or power fails.

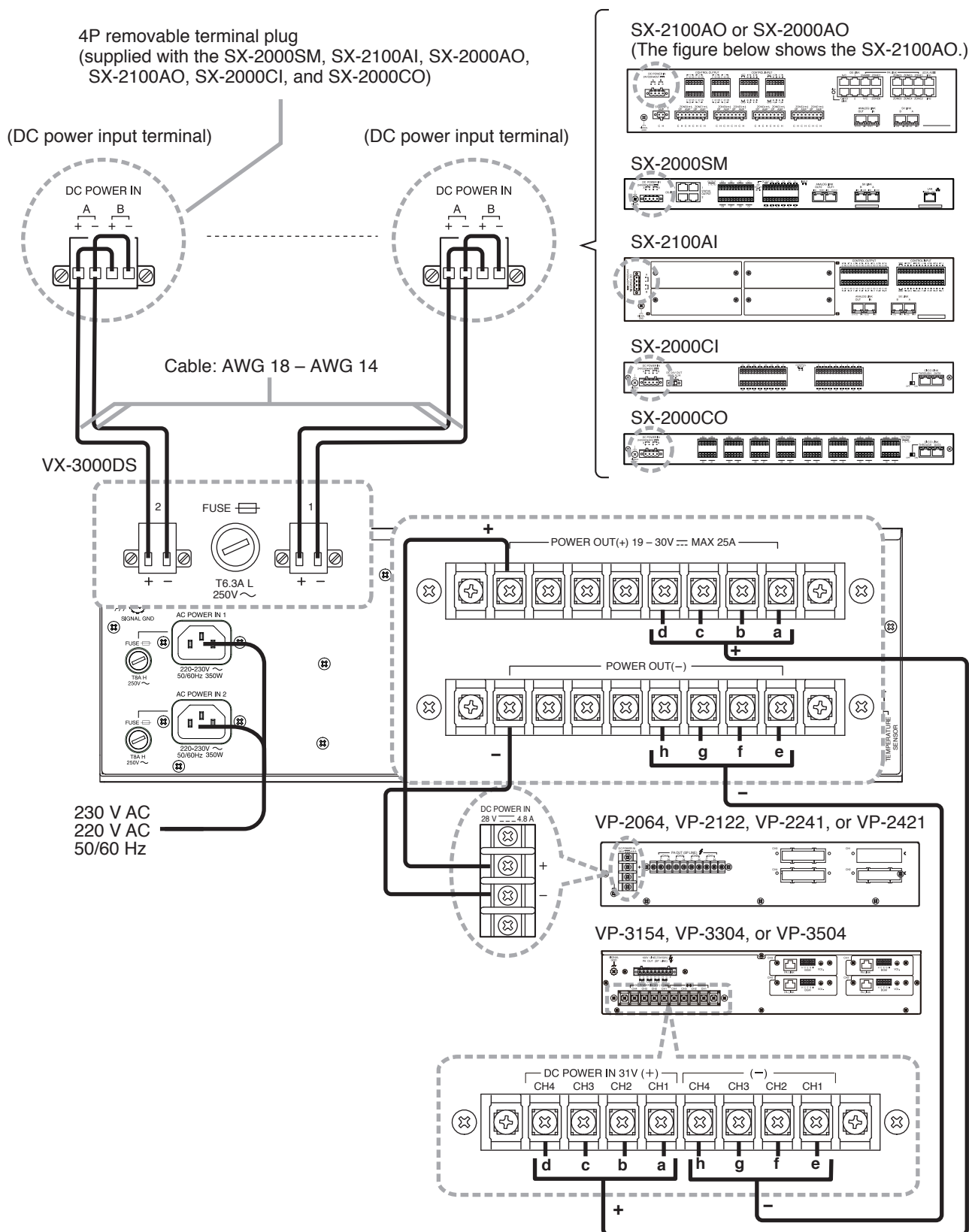


Note

For DC power supply to each component, it is possible to use either of "POWER OUT 19 – 33 V MAX 5 A" terminal or "POWER OUT 19 – 33 V MAX 25 A" terminal.

5.2.2. When not using a redundant power system

Required power is supplied to the system from a single power supply unit. Connect the [+] terminal of Input A to the [+] terminal of Input B, and the [-] terminal of Input A to the [-] terminal of Input B.



Notes

- To supply DC power to each component such as SX-2100AO and SX-2000SM except power amplifiers, the VX-3000DS' "POWER OUT 19 – 33 V MAX 25 A" terminal can also be used.
- The maximum number of the devices connected to and the output power supplied from one VX-3000DS must be within the specified limit shown below. Failure to observe this instruction may cause damage to the unit.

Model of the connected amplifier	Total number of the connected devices	Total output power
VP-3154, VP-3304, VP-3504	Max. 8 channels	2000 W or less
VP-2064, VP-2122, VP-2241, VP-2421	Max. 8 units	1440 W or less

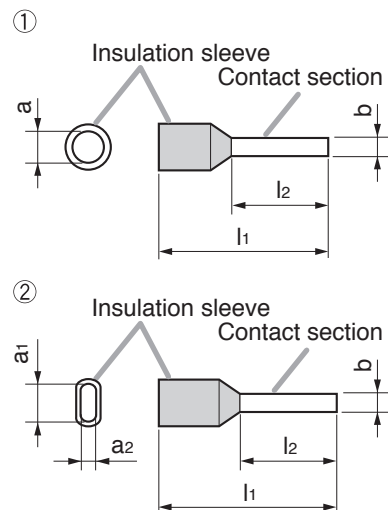
[Cable termination]

When connecting 2 power cables to a single terminal of the removable terminal plug, use a ferrule terminal with an insulation sleeve to crimp the cables because such cable conductors could become loose.

Recommended "Phoenix Contact" ferrule terminals for power supply cables

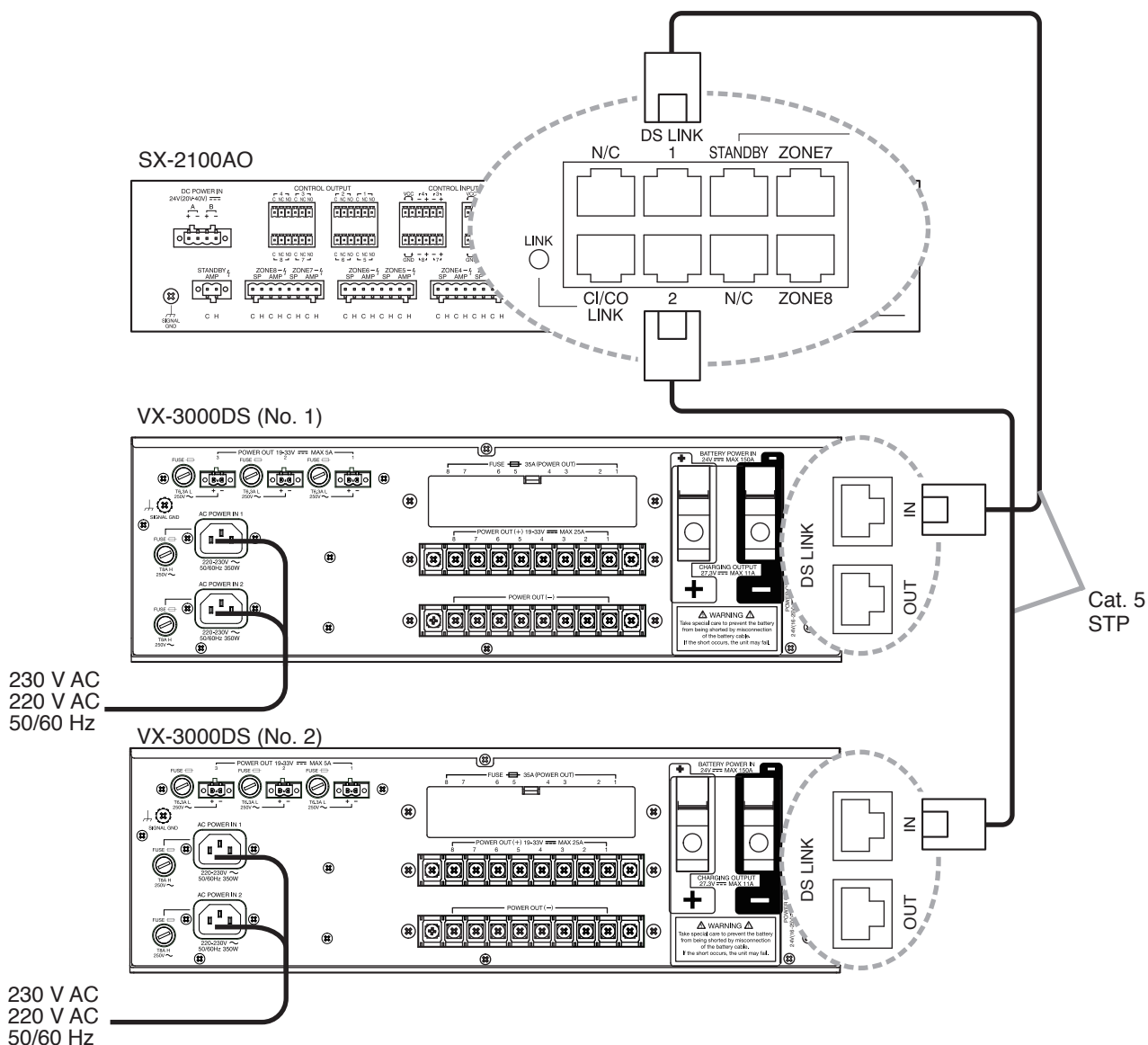
	Model Number	a	a ₁	a ₂	b	l ₁	l ₂
①	Al 1,5-8 BK	3.4 mm	—	—	1.8 mm	14 mm	8 mm
②	Al-TWIN 2 x 1,5-8 BK	—	6.6 mm	3.6 mm	2.3 mm	16 mm	8 mm

Crimping tool: CRIMPFOX UD6-4 (made by Phoenix Contact)

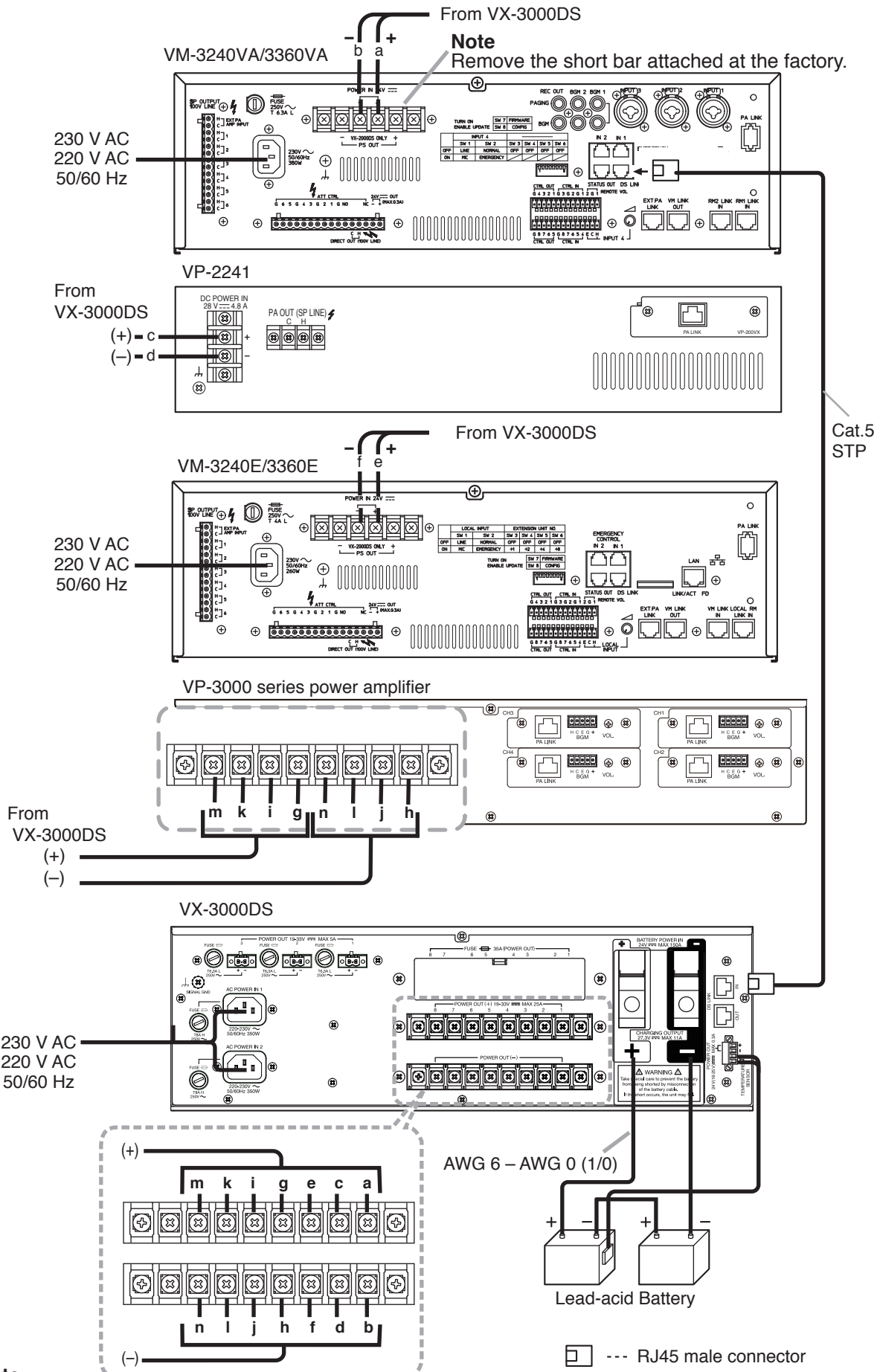


5.2.3. DS LINK terminal connections

Connect the DS LINK terminal of the VX-3000DS to the DS Link terminal of the SX-2000SM or SX-2100AO. The figure below shows a connection example when the VX-3000DS units are connected to the SX-2100AO. This connection also applies to the SX-2000SM.



5.3. Connecting the VX-3000DS to VM-3000 System



Note

The maximum number of the devices connected to and the output power supplied from one VX-3000DS must be within the specified limit shown below. Failure to observe this instruction may cause damage to the unit.

Model of the connected amplifier	Total number of the connected devices	Total output power
VP-3154, VP-3304, VP-3504	Max. 8 channels	2000 W or less

5.3.1 Required number of VX-3000DS units in a 1-channel broadcasting system

The required number of the VX-3000DS Power Supply Manager units is determined depending on the application of the system configured with the VM-3240VA, VM-3360VA, VM-3240E, and VM-3360E (hereinafter called "VM amplifier"), and/or the VP-2241, VP-2421, VP-3304, and VP-3504 (hereinafter called "VP amplifier").

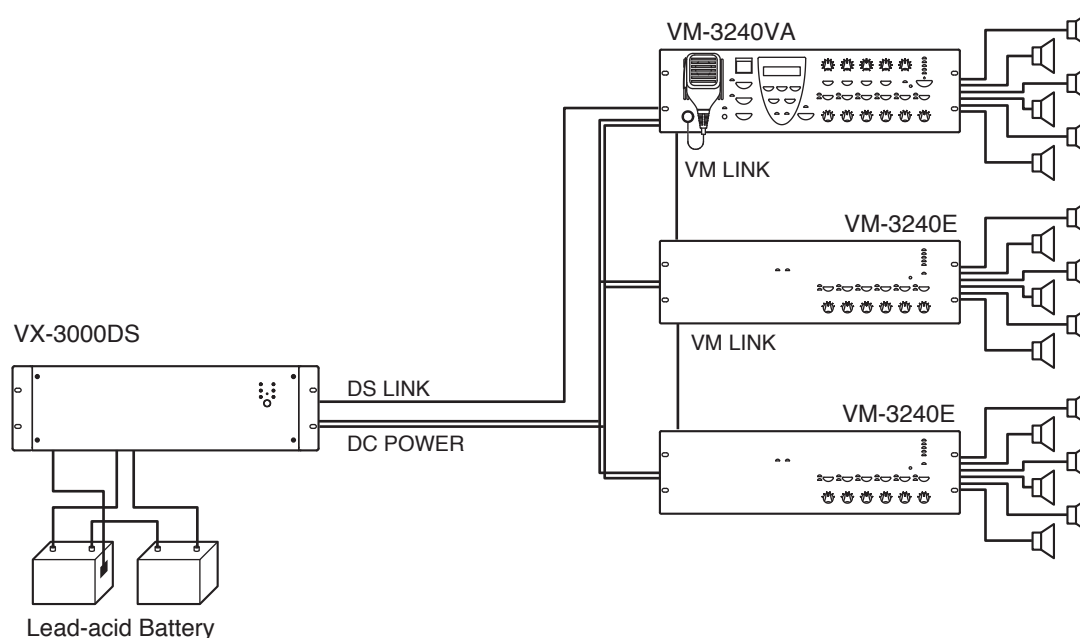
[System including VM amplifiers only]

One VX-3000DS is required every 4 VM-3360VA/3360E amplifiers or 6 VM-3240VA/3240E amplifiers.

No. of VM-3360VA/3360E	1	2	3	4	5	6	7	8	9	10
No. of VX-3000DS units	1				2				3	

No. of VM-3240VA/3240E	1	2	3	4	5	6	7	8	9	10
No. of VX-3000DS units	1						2			

Below is an example showing that one VX-3000DS is used in a system including 3 VM amplifiers.



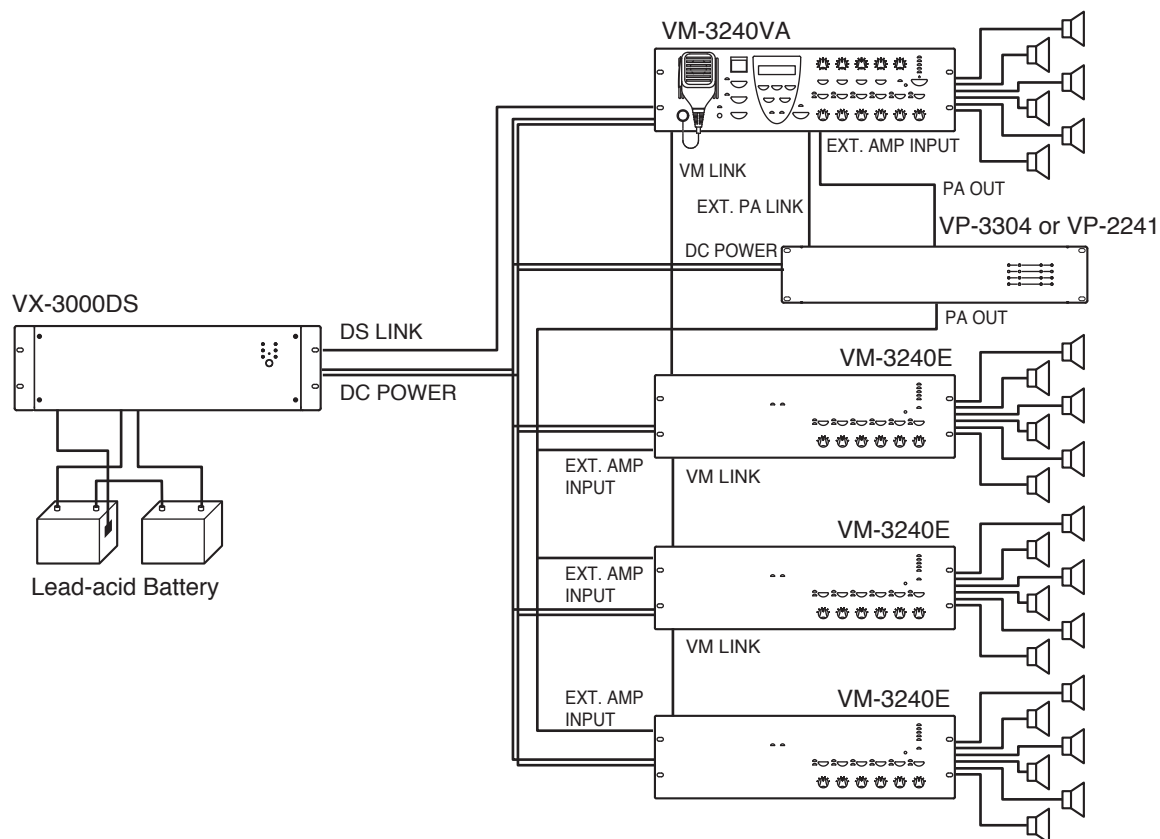
[System including one VP amplifier connected as a standby amplifier]

One VX-3000DS is required every 4 VM-3360VA/3360E amplifiers or 6 VM-3240VA/3240E amplifiers.

No. of VM-3360VA/3360E	1	2	3	4	5	6	7	8	9	10
No. of VX-3000DS units	1				2				3	

No. of VM-3240VA/3240E	1	2	3	4	5	6	7	8	9	10
No. of VX-3000DS units	1						2			

Below is an example showing that one VX-3000DS unit is used in a system including 4 VM amplifiers.



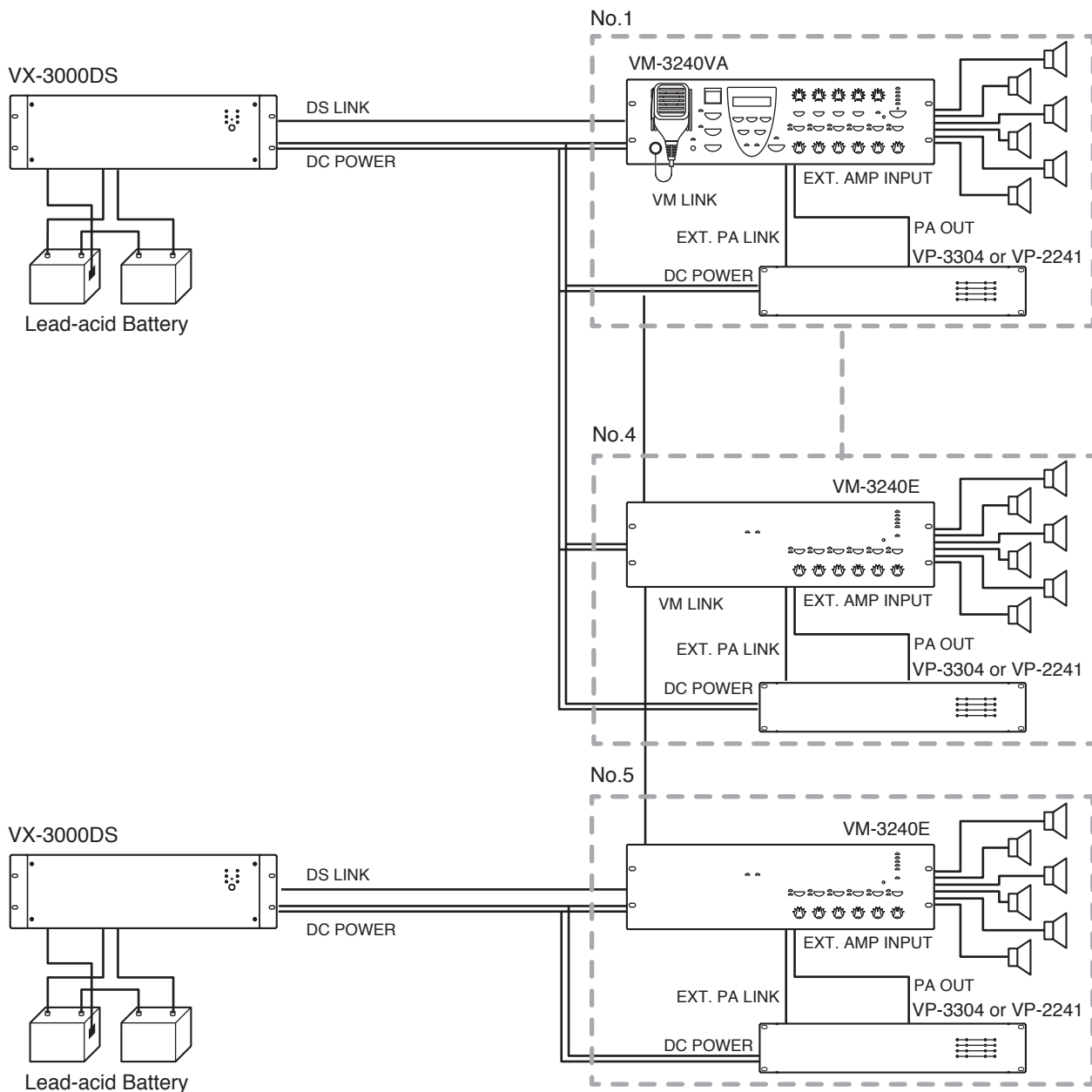
[Required number of VX-3000DS units in a BGM/Paging system]

One VX-3000DS is required every 3 VM-3360VA/3360E amplifiers or 4 VM-3240VA/3240E amplifiers.

No. of VM-3360VA/3360E	1	2	3	4	5	6	7	8	9	10
No. of VX-3000DS units	1			2			3			4

No. of VM-3240VA/3240E	1	2	3	4	5	6	7	8	9	10
No. of VX-3000DS units	1				2				3	

Below is an example showing that 2 VX-3000DS units are used in a system including 5 VM-3240VA/3240E amplifiers.



Notes

- A pair of the VM amplifier and VP amplifier should be connected to the same VX-3000DS.
- The maximum number of the devices connected to and the output power supplied from one VX-3000DS must be within the specified limit shown below. Failure to observe this instruction may cause damage to the unit.

Model of the connected amplifier	Total number of the connected devices	Total output power
VP-3154, VP-3304, VP-3504	Max. 8 channels	2000 W or less
VP-2064, VP-2122, VP-2241, VP-2421	Max. 8 units	1440 W or less

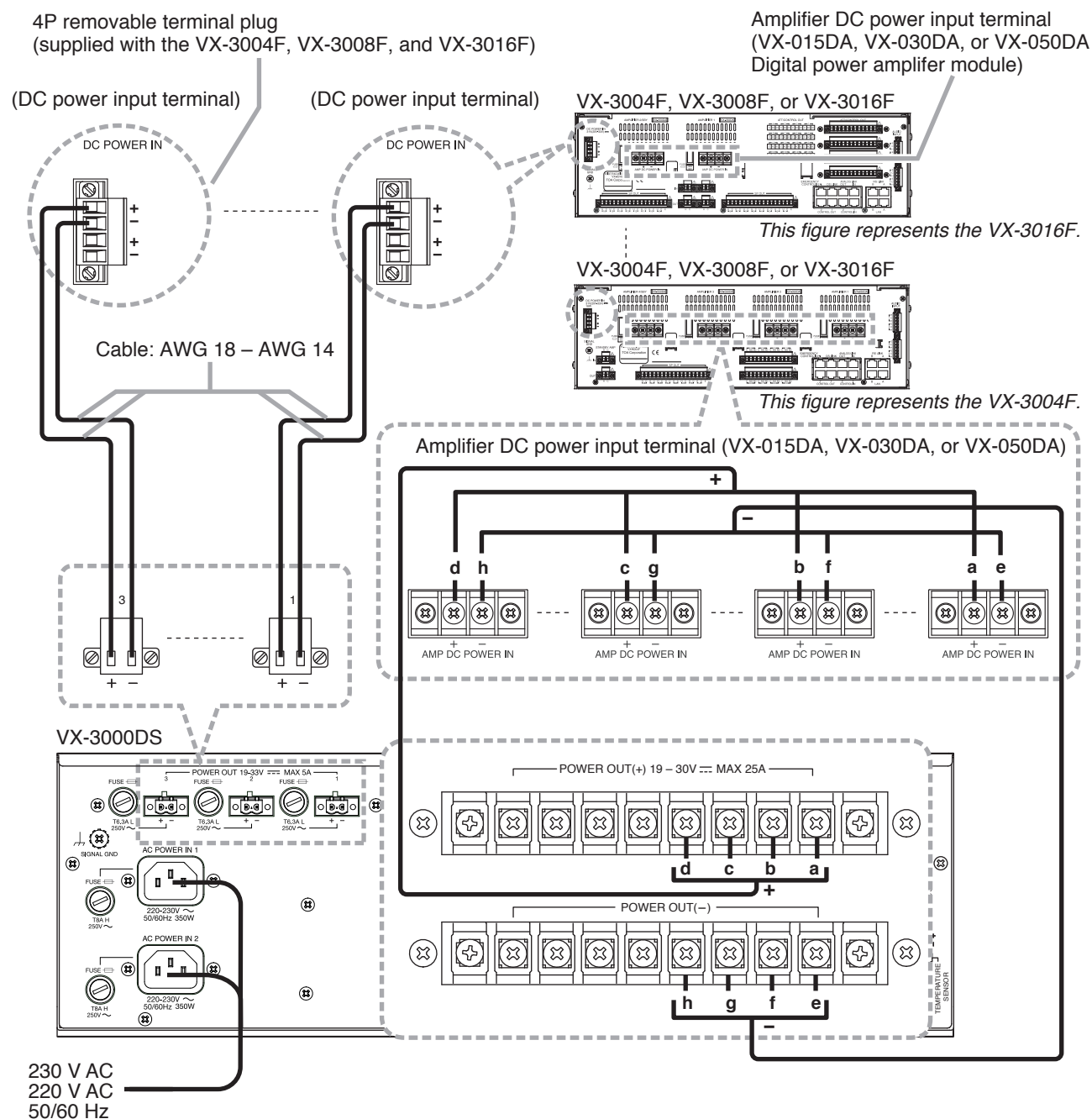
5.4. Connecting the VX-3000DS to VX-3000 System

5.4.1. DC power output terminal connections

Required power is supplied to the system from a single power supply unit.

Note

A redundant power system of the VX-3000DS cannot be applied to the VX-3004F, VX-3008F, and VX-3016F.



Notes

- The VX-3000DS' "POWER OUT 19 – 33 V MAX 5 A" terminal cannot be used for connecting the Digital amplifier modules with the VX-3000DS.
- The maximum number of the devices connected to and the output power supplied from one VX-3000DS must be within the specified limit shown below. Failure to observe this instruction may cause damage to the unit.

Model of the connected amplifier	Total number of the connected devices	Total output power
VX-015DA, VX-030DA, VX-050DA	Max. 8 units	2000 W or less

[Cable termination]

When connecting 2 cables or a shielded cable to a single terminal, use a ferrule terminal with an insulation sleeve to crimp the cables because such cable conductors could become loose.

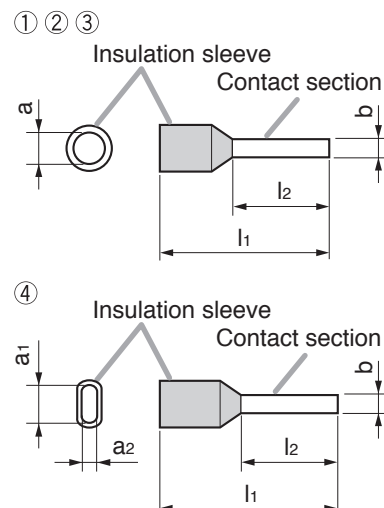
Recommended ferrule terminals for signal cables
(made by DINKLE ENTERPRISE) Unit: mm

	Model Number	a	b	l ₁	l ₂
①	DN00308D	1.9	0.8	12	8
②	DN00508D	2.6	1	14	8

Recommended ferrule terminals for power supply cables
(made by DINKLE ENTERPRISE) Unit: mm

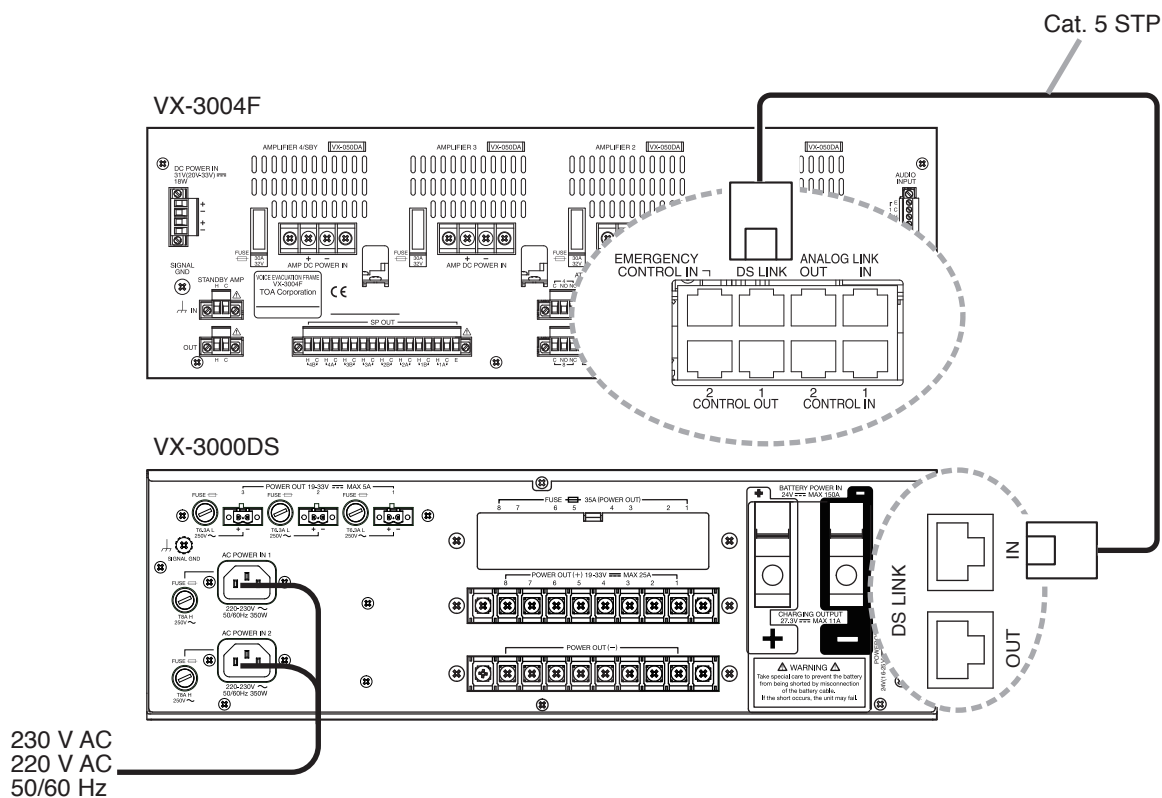
	Model Number	a	a ₁	a ₂	b	l ₁	l ₂
③	DN01508D	3.5	—	—	1.7	14	8
④	DN01508B	—	6.6	3.6	2.3	16	8

Crimping tool: DNT01-2206B (made by DINKLE ENTERPRISE)



5.4.2. DS LINK terminal connections

Connect the DS LINK terminal of the VX-3000DS to the DS Link connectors of the VX-3004F, VX-3008F, or VX-3016F. The figure below shows a connection example when the VX-3000DS units are connected to the VX-3004F. This connection also applies to the VX-3008F and VX-3016F.







6. CABLE USAGE TABLE

[VX-3000DS]

Terminal to Connect		Cable Type			Equipment to be Connected to		
Terminal Name	Equipment Receptacle	Plug	Cable Type	Plug	Equipment	Terminal Name	Equipment Receptacle
AC POWER IN1,2	3P inlet	—	Supplied cable	—	230 V AC, 50/60 Hz 220 V AC, 50/60 Hz	—	—
DS LINK IN/OUT	RJ45 (female)	RJ45 (male)	Cat. 5 STP	RJ45 (male)	SX-2000SM, SX-2100AO, VX-2000SF, VM-3240VA, VM-3360VA, VM-3240E, VM-3360E, VX-3004F, VX-3008F,VX-3016F	DS LINK DS-SF LINK	RJ45 (female)
BATTERY POWER IN	Screw terminal	Unprocessed cable end	AWG 6 – AWG 0 (AWG 1/0) 16 – 50 mm ² (line resistance within 4 mΩ/total)	Unprocessed cable end	Lead-acid battery	Electrode (+, -)	—
POWER OUT 19-33 V MAX 25 A	Screw terminal	Round terminal	AWG 18 – AWG 14 0.8 – 2.0 mm ²	Round terminal	VX-2000, VX-2000SF, VP-2064/2122/2241/ 2421, VP-3154/3304/3504, VX-015DA/030DA/050DA	DC POWER IN	2P screw terminal
			—	DC plug (Outer diameter: F5.5 mm Inner diameter: F2.1 mm Length: 9.5 mm)	RM-200X RM-200SA RM-300X	DC IN	DC jack
			AWG 24 – AWG 12 0.2 – 3.5 mm ²	Unprocessed cable end	RM-200XF	LINK (DC Power In+)	9P plug-in screw terminal
			AWG 18 – AWG 14 0.8 – 2.0 mm ²	Round terminal	SX-2000SM, SX-2100AI, SX-2000AO, SX-2100AO, SX-2000CI, SX-2000CO, VX-3004F, VX-3008F, VX-3016F	DC POWER IN	4P removable terminal plug
			AWG 10 – AWG 8 5.5 – 8.0 mm ²	Round terminal	VM-3240VA VM-3360VA VM-3240E VM-3360E	DC POWER IN	2P screw terminal
			AWG 24 – AWG 12 0.2 – 3.5 mm ²	Round terminal	RM-200SF RM-300MF	DC IN 24 V	Screw terminal
POWER OUT 19-33 V MAX 5 A	2P plug in screw terminal	Unprocessed cable end	AWG 18 – AWG 14 0.8 – 2.0 mm ²	Round terminal	VX-2000 VX-2000SF	DC POWER IN	2P screw terminal
			—	DC plug (Outer diameter: F5.5 mm Inner diameter: F2.1 mm Length: 9.5 mm)	RM-200X RM-200SA RM-300X	DC IN	DC jack
			AWG 24 – AWG 12 0.2 – 3.5 mm ²	Unprocessed cable end	RM-200XF	LINK (DC Power In+)	9P plug-in screw terminal
			AWG 18 – AWG 14 0.8 – 2.0 mm ²	Round terminal	SX-2000SM, SX-2100AI, SX-2000AO, SX-2100AO, SX-2000CI, SX-2000CO, VX-3004F, VX-3008F, VX-3016F	DC POWER IN	4P removable terminal plug
			AWG 24 – AWG 12 0.2 – 3.5 mm ²	Round terminal	RM-200SF RM-300MF	DC IN 24 V	Screw terminal
POWER OUT 24 V (16-25 V) MAX 0.3 A	2P plug in screw terminal	Unprocessed cable end	—	DC plug (Outer diameter: F5.5 mm Inner diameter: F2.1 mm Length: 9.5 mm)	RM-200M	DC IN	DC jack

• VX-3000DS' DS LINK Connections

Connector Name	RJ45 Pin No.	Colour	Pair	Assignment	Direction/Level
DS LINK IN/OUT	1	Orange/white		Connection Check	Output/0 – 3.3 V
	2	Orange		Battery Failure	
	3	Green/white		Charging Circuitry Failure	
	4	Blue		DC Off	
	5	Blue/white		AC Off	
	6	Green		3.3 V DC Input	Input (DC)/3.3 V
	7	Brown/white		NC	—
	8	Brown		Battery Check Activation	Input/0 – 3.3 V
	Shield	Shield		Chassis GND	—

7. SWITCHING OFF SYSTEM POWER (DC)

When the system power (DC) needs to be shut off in such cases as maintenance or unit configuration change, follow the procedure below.

The system power can be completely shut off without being switched over to the backup power supply.

[To switch off the system power]

(Case 1: When in AC operation mode)

Step 1. Terminate all current broadcasts to stop system operation.

Step 2. Set the DIP switch's "Switch 8" to ON.

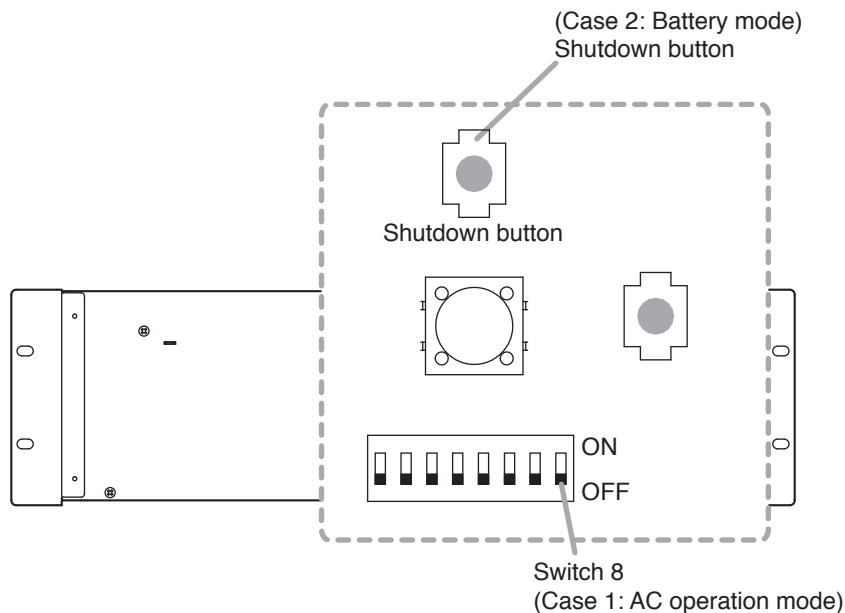
Step 3. Shut off the AC power source.

Step 4. When the unit's power is turned off, shift the DIP switch's "Switch 8" back to OFF.

(Case 2: When in Battery mode)

Step 1. Check the Battery indicator is lit.

Step 2. Hold down the shutdown button for 3 seconds.



[To switch on the system power]

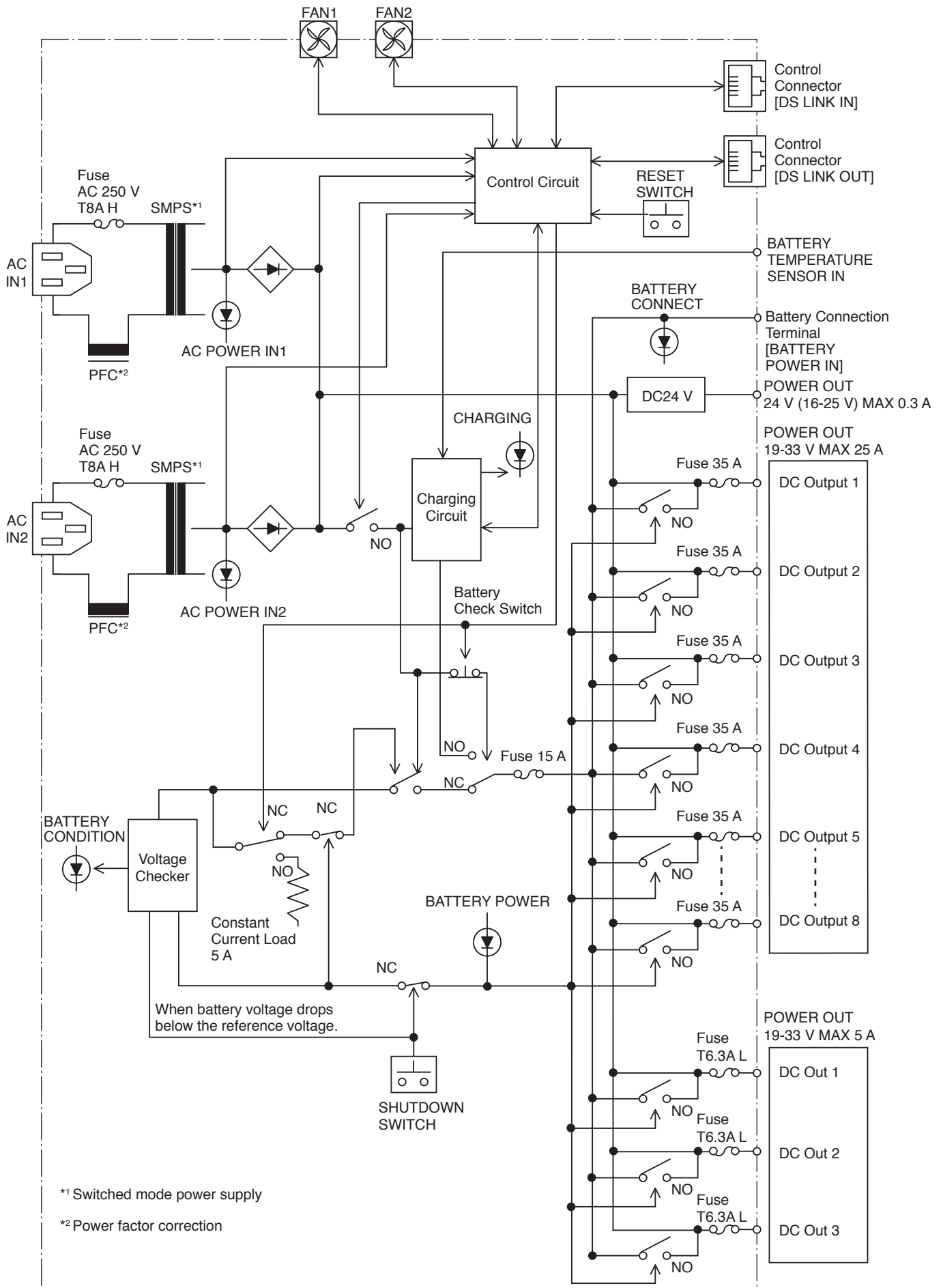
Step 1. Turn on the AC power source.

Step 2. Check the DIP switch's Switch 8 is OFF.

If not, place it to OFF position.

Step 3. Operate the system normally.

8. BLOCK DIAGRAM



9. APPENDIX: Recommendations to the Power Supply Installation

Incorrect installations of the power supply manager VX-3000DS and its related equipment as batteries can cause unnecessary fault indications. This information sheet gives you helpful hints and recommendations to avoid it.

Please also take care on the battery handling hints.

Battery

Storage

The recommended storage conditions (duration, temperature) of charged and uncharged batteries must not be exceeded to avoid a total discharge that destroys the battery. Consider the storage times listed below:

1. storage in factory, distributor, dealer and own company
2. in the project, when the VA system is installed but not in use, respective not powered, so that the batteries will not be trickle charged

The storage and discharge duration depend on the ambient temperatures and can be found in the battery data sheets. The maximum storage durations are:

Ambient temperature	Maximum time before re-charge
Less than 20°C	12 months
20°C – 30°C	9 months
20°C – 40°C	6 months

The production date is usually printed on the battery. In case you do not know the storage conditions of the dealer or distributor, then it is preferable consider the worst case.

Installation of the Batteries

Do not install the batteries in unvented rooms and cabinet racks. When putting the batteries on the bottom of the cabinet rack, then assemble minimum two height units (2 U) vented panels in front of them. The batteries may emit inflammable gas that may cause fire or an explosion (the sealed batteries have a safety vent).

Important: The installation place of the batteries must be vented!

The batteries can be put on the bottom and its sides but not upside down.

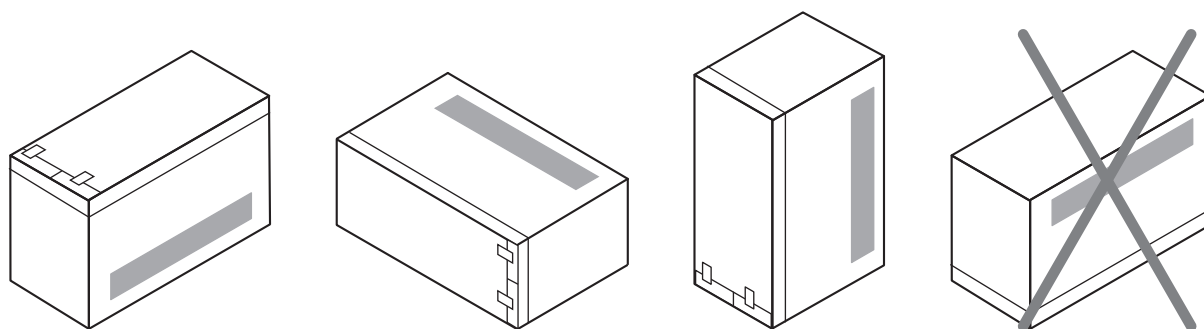


Figure 1: Permitted and forbidden installation positions of the battery

Fix the batteries with the hook-and-loop-tape (fastener hook and fastener loop) provided with the VX-3000DS to avoid them to shift away.

Battery Connection

Clean Contacts

Take care that the connection terminals are clean before connecting the cables. Clean them if necessary.

Ensure that the battery cables are inserted correctly into the battery terminals of the VX-3000DS and the screws are fastened tight.

Add one crown gear (toothed washer) on one side of the battery's terminal connection.

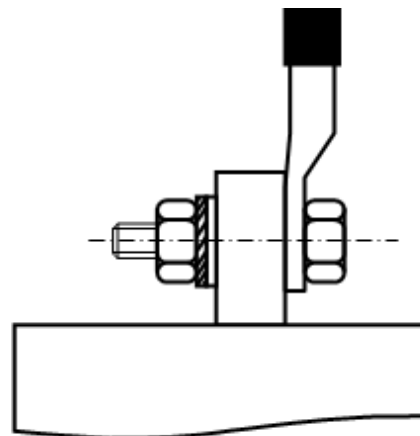


Figure 2: Connection to the battery terminal with a crown gear

Secure Battery Connection

When no AC-mains is connected to the VX-3000DS, then the batteries can be connected without sparks. Be careful when connecting the batteries to the VX-3000DS – the battery can easily provide some hundreds up to thousand amperes in case of a short circuit! This can destroy many devices easily. Connect the battery cables in the order described below. When disconnecting the batteries, then proceed in opposite order. Doing so will cause no damage of devices when accidentally touching metal parts of the cabinet or device with the battery cables.

1. Connect the plus terminal of the battery to the VX-3000DS (check on correct polarity and fixation in the battery cable clamp at the VX-3000DS).
2. Connect the minus terminal of the battery with the plus terminal of the second battery.
3. Connect the minus terminal of the second battery to the VX-3000DS.

(Steps 1 and 2 can be proceeded in opposite order)

Hints on Preservation

Check the batteries on cleanliness and clean if necessary at every maintenance and inspection of the voice alarm system. Be careful using solvents! We recommend to read the instructions for the batteries carefully. Organic solvents must never be used!

Use of other batteries than the recommended models

When not using the certified batteries, then the following specifications shall be provided by another battery model:

- charging voltage of the full battery at 25°C: 13.65 V (± 0.15 V) *
- temperature coefficient of the charging voltage: -20 mV/°C (-3.3 mV/°C per cell)
- internal resistance of the battery: $< 0.01 \Omega$

Temporary Shutdown of the Voice Alarm System

When shutting down the system longer than one month, then disconnect the batteries.

VX-3000DS

The power manager VX-3000DS monitors the availability of the AC power and switches on the battery in case of a total loss of that power.

When the AC power is available, then the batteries will be charged. The charge current is monitored, and when it is below 2 mA, then a charger fault will be entered into the log file of the system. The indications "BATTERY CONNECT" and "CHARGING" do not light.

The battery surveillance of the VX-3000DS measures the resistance of the battery circuit at the set intervals. A battery fault will be logged when this resistance is higher than the initial value set by the DIP switch (p. 6). The indication "BATTERY CONDITION" extinguishes. The battery test can be proceeded by pushing the button "BATTERY CHECK".

The VX-3000DS should be installed at a low position in the cabinet rack.

Temperature Sensor

Purpose and Characteristics

The temperature sensor measures the ambient temperature of the battery to control the charging voltage. When the voltage is too high, then the battery can produce gas that can cause the battery to break. The gas can leak through the pressure control valve and develop an explosive gas, therefore the cabinet rack and the room must be vented. The battery cannot be charged fully when the charging voltage is too low. When the current into the battery is less than 2 mA, then a charger error will be logged and the "Charge" LED extinguishes.

The temperature sensor must not be disconnected during charging of the battery because then the charging voltage becomes high causing the dangerous situations explained above. When exchanging the temperature sensor, the charging voltage of the VX-3000DS must be re-adjusted by TOA dealer.

Installation

In opposition to the battery, the temperature sensor reacts on ambient temperature changes, therefore it must not be exceeded to such changes. Such can occur near temperature-controlled fans as in the VX-3000DS. We recommend to provide vents at the cabinet rack's bottom and top to allow the development of a constant airstream from bottom to top (chimney effect). This reduces warm air from the devices swapping randomly inside the cabinet that can cause a randomly occurring charger fault.

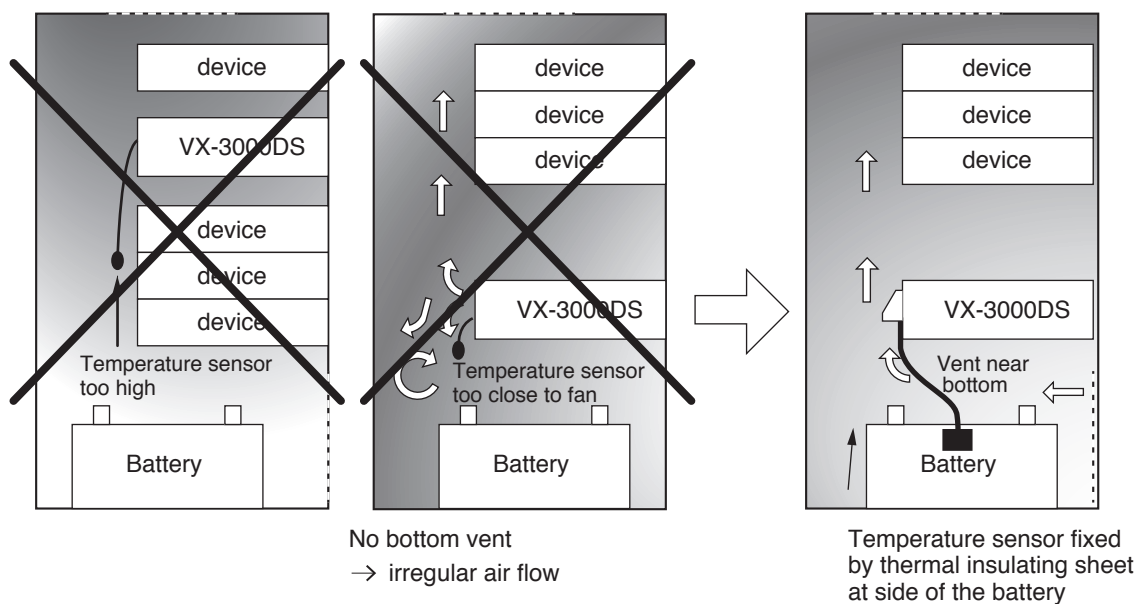


Figure 3: Incorrect and correct positioning of the temperature sensor in the cabinet rack

The temperature sensor can be placed between 2 batteries by fixing it on one of them using the supplied thermal insulating sheet. Do not damage the temperature sensor when pushing the batteries together.

The temperature sensor cable can be expanded by some metres causing no problems.

Trouble Shooting

The different faults described below are indicated on the front panel (Figure 4). Refer to the explanation below.

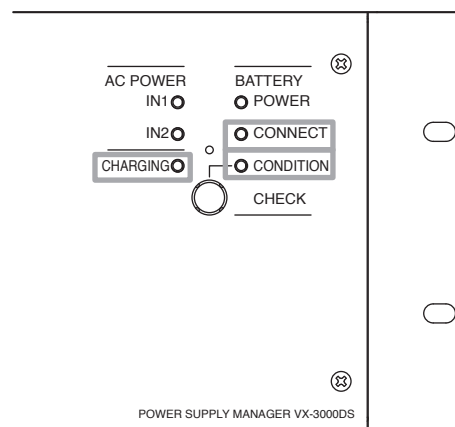


Figure 4: indications on VX-3000DS

Charger Fault

A charger fault occurred when the indications “Charging” and “Battery Connect” extinguish on the VX-3000DS.

Reason	Measures
Battery not connected or Charging circuit faulty	Check the battery connections. Clean the connectors or fix the connectors when necessary.
The temperature of the temperature sensor is higher than that of the battery or disconnected.	Install the temperature sensor as recommended. (p. 28)
At least one of the fuses at DC output terminals “POWER OUT 19-33V MAX 5A” or “POWER OUT 19-33V MAX 25A” blown.	Check each fuse to find which one is blown. Then, replace the blown fuse with the supplied one. If the fuse blows again, consult your TOA dealer.
Internal fuse (15 A) of the VX-3000DS blown.	Consult your TOA dealer.
Either or both fans do not operate.	

Battery Fault

Reasons of a battery fault indication:

1. resistance increase at the contacts due to corrosion
2. the battery's internal resistance is too high.

Determination of the resistance of the cable and connectors

Case 1 can be checked with a voltmeter (multi-meter) with a resolution of 1 mV. It is used for measuring the voltage losses of the cables and connections. The voltages are to be added, then sum to be divided by 5 to obtain the resistance.

Check procedure 1:

The measuring tool must be able to indicate the voltage quickly or must provide a peak-hold function because the current for the measurement is supplied for two (2) seconds only.

Measure of the voltage of each cable path after depressing the battery check button of the VX-3000DS. When A fuse vis in the path must be included in the measurement. Proceed one measurement per minute maximum.

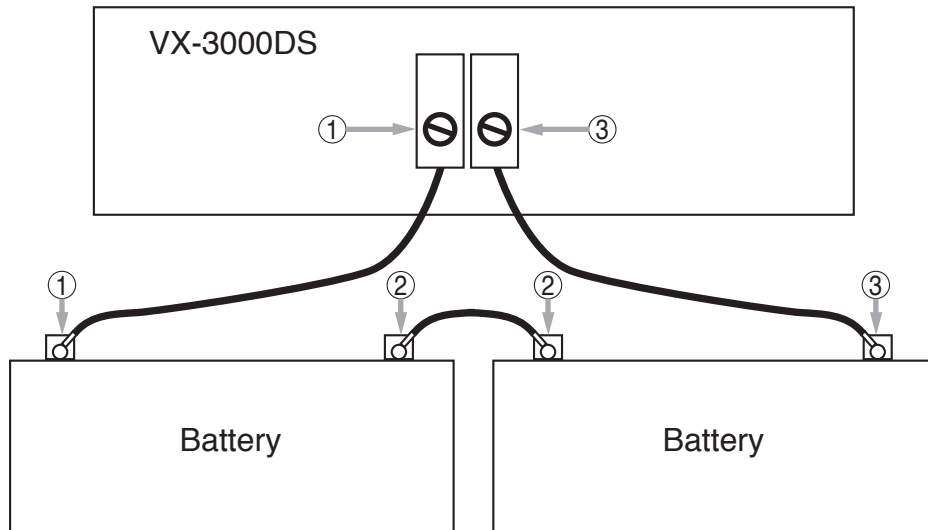
Check procedure 2:

This measurement can be done with a slow voltmeter.

Disconnect the VA unit's power supply from the DC output from the VX-3000DS and connect a load of 5 - 6 Ω / 600 W to the DC output (when the current of the connected system components is known), then take care that the total current is approximately 5 A. Do not measure a too long time to avoid reducing the battery's capacity too much.

Measure the voltage of each cable path while the load is connected.

Measuring Points



Touch the battery contacts and the screw tops of the battery connector of the VX-3000DS with the measuring tips as shown above.

Do not measure the voltage at the cable clamps, because in this case the contact resistance is excluded from the measurement.

Measure the voltage on each path (it may contain a fuse).

Add these voltages and divide by 5 (5 A current).

The result is the resistance. When it exceeds 0.004 Ω , then check the contacts, clean them if necessary and tighten it. Alternative: max. voltage = 20 mV.

Example:

Current $I = 5$ A, measured voltages: 1 : 120 mV, 2 : 10 mV, 3 : 50 mV

Total voltage: 180 mV = 0.18 V. $R = 0.18 \text{ V} / 5 \text{ A} = 0.036 \Omega > 0.004 \Omega$

The total resistance is too high. Since path 1-1 has a much higher resistance than path 3-3, its connection should be checked.

When the resistance is below 0.004 Ω , then the battery can be defective (too old).

Measuring the battery's internal resistance

There are special but expensive measuring tools for battery impedances. Usually when the battery's internal impedance is double than typical, then the battery should be exchanged.

10. SPECIFICATIONS

Power Source	220 – 230 V AC, 50/60 Hz
Power Consumption	2800 W max. in total (at rated output with charging) 650 W max. in total, 350 W max. each (EN60065)
DC Power Output (AC mode)	Rated output: 2300 W (total DC power output) Peak output: 2780 W (total DC power output)
Current Specification	Maximum output current from the battery : 50 A Rated maximum continuous output current, I max. a : 50 A Rated maximum short duration output current, I max. b : 50 A Rated minimum output current, I min.: 0 A Ripple Voltage at I max. b: 4 V max.
DC Power Output	8 x 31 V (19 – 33 V) 25 A max. each, M4 screw terminal, distance between barriers: 11 mm 3 x 31 V (19 – 33 V) 5 A max. each, removable terminal block (3 x 2 pins) 1 x 24 V (16 – 25 V) 0.3 A max., removable terminal block (1 x 2 pins)
Charging Method	Temperature compensated trickle charging
Charging Output Voltage	27.3 V \pm 0.3 V (at 25°C) Temperature correction coefficient: –40 mV/°C
Battery Connection	1 pair of positive and negative terminals Applicable cable diameter: AWG 6 – AWG 0 (AWG 1/0) (16 – 50 mm ²) Line resistance within: 4 m Ω /total
Applicable Battery	Panasonic: LC-X1265PG/APG (65 Ah), LC-XA12100P (100 Ah), LC-XB12100P* (100 Ah) Yuasa: NP65-12 (65 Ah), NPL100-12 (100 Ah) * Compliant with EN 54-4
Control Connector (DS LINK IN/OUT)	RJ45 female connector for connecting the system and cascade connection Shielded twisted-pair straight cable (TIA/EIA-568A standard) Type of control signal: Battery check, AC power status, DC Power status, charging circuit failure, battery failure, and communication
Panel Indicator	AC power IN1, IN2: Green LED Charging: Green LED Battery power: Green LED Battery connect: Green LED Battery condition: Green LED
Operating Temperature	–5 to +45°C
Operating Humidity	90% RH or less (no condensation)
Finish	Panel: Surface-treated steel plate, black (30% gloss), paint
Dimensions	482 (w) x 132.6 (h) x 400.5 (d) mm
Weight	11.8 kg
Fuse Rating	Blade fuse (35 A), Fuse (T8A H), Fuse (T6.3A L)

Note: The design and specifications are subject to change without notice for improvement.

• Accessories

Fuse T8A H	2	Fastener hook	4
Fuse T6.3A L	2	Fastener loop	4
Blade fuse (35 A).....	2	Sticker (Declaration of compliance)	1
Rack mounting screw (with plain washer) 5 x 12	4	CAT5 STP cable (3 m)	1
Power cord (2 m)	2	Thermal insulating sheet	1
		Ferrite cable clamp	1

Traceability Information for Europe

Manufacturer:
TOA Corporation
7-2-1, Minatojima-Nakamachi, Chuo-ku, Kobe, Hyogo, Japan

Authorized representative:
TOA Electronics Europe GmbH
Suederstrasse 282, 20537 Hamburg, Germany