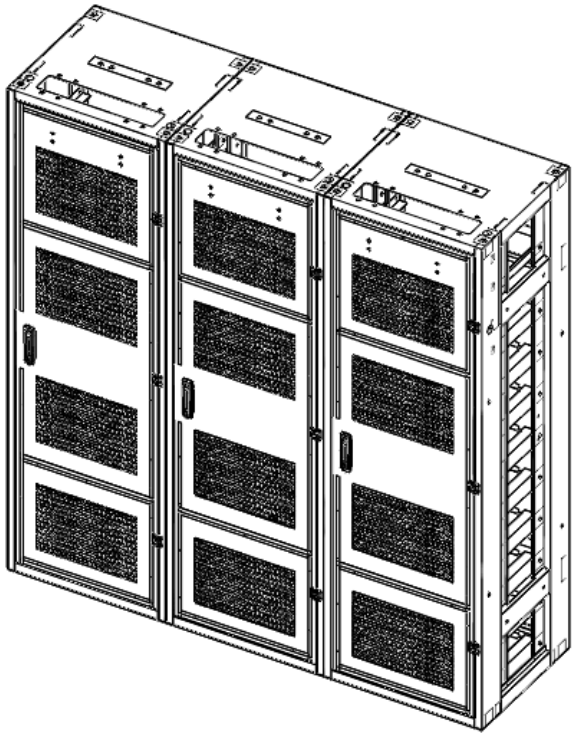
SAMSUNG SDI

LIB System for UPS

Installation Manual (136S)



English 6/2018. Rev 0.81

Read this manual carefully before starting to install the battery system.
Keep these instructions for future reference.

Important Safety Instructions

Read and follow these instructions!

The following precautions are intended to ensure your safety and prevent property damage. Before installing this product, be sure to read all safety instructions in this document for proper installation.

DANGER

Failure to comply with the instructions with this symbol may result in a serious accident, causing death or a severe injury.

WARNING

Failure to comply with the instructions with this symbol may result in a serious accident, causing a severe injury.

CAUTION

Failure to comply with the instructions with this symbol may result in minor or moderate injury.

NOTICE

Provides information considered important but not hazard-related. The information relates to property damage.

Important

Indicates valuable tips for optimal installation and operation of the product.

General Instructions

Please be aware that a battery presents a risk of electrical shock including high short-circuit current. Follow all safety precautions while operating the batteries.

- Remove watches, rings, and other metallic accessories.
- Use tools with insulated handles in order to avoid inadvertent short circuits.
- Wear rubber gloves and safety boots.
- Do not put tools or any metal parts on the top of the batteries.
- Disconnect charging source and load before connecting or disconnecting terminals.
- Use proper lifting means when moving batteries and wear all appropriate safety clothing and equipment.
- Batteries must be handled, transported and recycled or discarded in accordance with federal, state, and local regulations. Do not dispose of the batteries in a fire because they can explode.
- Do not open or mutilate the batteries.
- Only authorized, trained technicians should perform annual preventive maintenance.
- Only qualified personnel who are familiar with the batteries and safety precautions should perform installation or maintenance of the battery.
- Do not allow unauthorized personnel to contact the batteries.

Safety Precautions

The following precautions provide general safety guidelines that should be followed when working with or near the Energy Storage System (ESS). Complete safety parameters and procedures are site-specific and should be developed by the customer for the installation site.

- Review and refer to all safety warnings and cautions in this manual before installation.
- Build a clear, permanent, restricted access area around the system.
- Only authorized, adequately trained electrical operators should be able to access the system.

The interior design of this equipment must be considered a “no-go area except for non-qualified personnel who are familiar with the batteries and safety precautions,” depending on the location. Consult local codes and applicable rules and regulations to determine permit requirements. If required, mark enclosures appropriately before beginning work.

Personnel and Equipment Warnings

Personnel in contact with the battery system should be aware of the following hazards:

WARNING—SHOCK HAZARD

Do not contact system connectors or terminals. Do not open the enclosure doors unless proper lock out/tag out procedures and related trainings are followed in accordance with the local codes and regulations.

WARNING—ARC FLASH HAZARD

There is an arc flash hazard associated with all electrical equipment. There is a serious risk of arc flash relating to any equipment modification (e.g. opening doors). Serious injuries can occur in arc flash incidents. Appropriate training is required in accordance with local codes and regulations.

WARNING—FIRE HAZARD

Fire may occur under certain fault conditions.

CAUTION—PINCH POINTS

Multiple pinch-points are present in most system components. Be aware that there is a serious risk of injury while working around and in equipment enclosures.

CAUTION—STATIC SENSITIVE

Electronic appliances can be damaged by electrostatic discharge. Proper handling procedures are required. Be sure to wear a grounded anti-static wrist strap and to discharge static electricity by touching a grounded surface near the equipment before touching any system components.

Dangerous Voltages

DANGER

The ESS is powered by multiple power sources. Hazardous voltages may be present in the equipment even when it does not appear operational. Make sure that you completely understand the cautions and warnings in this installation manual. Failure to do so may result in serious injury or death. Follow all manufacturer-published safety procedures.

Electrical equipment can present a risk of electrical shock and can cause arc flash. The following precautions must be observed when working on or around electrical equipment:

- Remove watches, jewelry, rings, and other metallic objects.
- Use tools with insulated handles.
- Safety clothing and shoes must comply with local codes and regulations.

Lock Out/Tag Out Guidelines

DANGER

Follow all applicable lock out/tag out procedures at all times. Failure to follow proper lock out/tag out procedures may result in serious injury or death.

With power applied to the ESS, hazardous voltages are present on some components. To prevent accidental death or injury, do not touch any components within the enclosure unless you are specifically directed to do so. To reduce the risk of electrical shock, make sure that all equipment is properly grounded. For more information, refer to 3.1 Grounding the Battery System

WARNING

Enclosure doors must remain closed except when access to the enclosure interior is required. If possible, personnel should keep a safe distance from enclosures whenever the equipment is energized. Always comply with local, state, and national lock out/tag out guidelines when working with or near the ESS. The lock out/tag out procedures must meet or exceed the requirements of all guidelines presented in SAMSUNG SDI safety documentation. Before entering potentially hazardous areas or beginning work on the ESS, complete the following tasks:

- Identify and wear protective clothing and shoes.
- Identify and isolate all power and stored energy sources.
- Apply appropriate lock out/tag out devices. When applying lock out/tag out to the ESS, do not touch anything within the enclosure except as specifically directed in the work procedures.
- Complete the site-specific lock out/tag out procedures and safety checklist before beginning work.

General Warnings

DANGER

When energized, this equipment presents a potential hazard of electric shock, death, and burn. Only authorized personnel who are thoroughly familiar with the equipment and adequately trained should install, operate, or maintain this equipment.

DANGER

To avoid death, personal injury, or damage to the product, follow all safety procedures as regulated by Environmental Health and Safety (EHS) guidelines.

DANGER

To minimize the hazards of electrical shock, death, and burns, approved grounding practices and procedures should be strictly followed.

WARNING

To avoid personal injury and damage to equipment, personnel must adhere to the site protocol concerning working at heights.

WARNING

To avoid personal injury or equipment damage caused by equipment malfunction, only adequately trained personnel should modify any programmable machine.

WARNING

Always ensure that applicable standards and regulations are followed and only properly certified equipment is used as a critical component of a safety system. Never assume that a safety-critical control loop is functioning correctly.

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1. About this Manual

To make sure that you understand the proper procedures for safe operation, this section briefly describes the purpose, audience, organization, revision history, and acronyms and abbreviations.

1.1 Purpose

The purpose of this manual is to provide information for the safe and successful installation of the product

The instructions in this manual are based on assembly of a three-cabinet system. Other configurations are possible and theses instructions can be reduced or expanded to accommodate installation of those systems.

1.2 Target Audience

This installation manual is intended for system administrators and operators who install and configure the product.

1.3 Organization

This manual is composed of the following chapters:

- Chapter 1, “About this Manual,” outlines this document.
- Chapter 2, “Product Description,” describes the major components of the product.
- Chapter 3, “Installing the Product,” explains how to install the product.

1.4 Revision History

Rev.	Description	Author	Date
0.0	First Draft (tentative release)		2016.05.27
0.1	First Release		2016.07.04
0.2	2.1.3 SMPS Assembly - Dry contact info revised		2016.08.26
0.3	Edited for comments		2016.10.14
0.4	Edited for comments		2016.10.24
0.5	Edited for comments Corrected for grammatical error Rack clearance distance added BMS Configuration edited		2016.12.21
0.6	Document number added Table 3-2 revised		2017.05.22
0.7	Edited for 136S		2018.02.23
0.8	Figure 3-114 and Table 3-11 corrected		2018.05.16
0.81	Table 3-2: Parts for 136S 3P Rack corrected Edited for confidential material		2018.06.08

Approved By:		
Name	Signature	Date

Trusted Reviewers		
Name	Signature	Date

1.5 Acronyms and Abbreviations

The following acronyms and abbreviations are used in this manual.

Abbreviations	Full Name
AED	Automated External Defibrillator
BMS	Battery Management System

Abbreviations	Full Name
EHS	Environmental Health and Safety
ESS	Energy Storage System
LOTO	LOCK OUT/TAG OUT
OT	Overtemperature
OVP	Overvoltage Protection
PCS	Power Conversion System
SMPS	Switched Mode Power Supply
SOC	State Of Charge
SOH	State Of Health
SG	Switchgear
UT	Undertemperature
UVP	Undervoltage Protection
UPS	Uninterruptible Power Supply

2. Product Description

For installation, check the components.

2.1 Major Components

This product has the following components:

- Module Assembly (Type A / Type B)
- Switchgear Assembly
- Rack BMS Assembly (embedded in Switchgear)
- Rack Frame
- SMPS Assembly (Type A / Type B)
- System BMS (Embedded in SMPS Assembly)

2.1.1 Battery Module (Type A / Type B)

The battery module consists of battery cells in an 8S1P configuration. Each module has a module BMS (Battery Management System). Its specifications are:

- Nominal capacity: 67 Ah
- Nominal voltage: 30.40 V
- Weight: 17 kg (37.48 lb.)
- Dimension (L x W x H): 414.00 mm x 216.00 mm x 163.00 mm (16.30 in. x 8.50 in. x 6.42 in.)

There are two types of 8S1P Battery Modules. The model number for each type is identified by the position of polarity. Type A's positive (+) terminal is on the right side when viewed from the front. Type B's positive terminal is on the left.

Following are front and rear views of a module assembly.

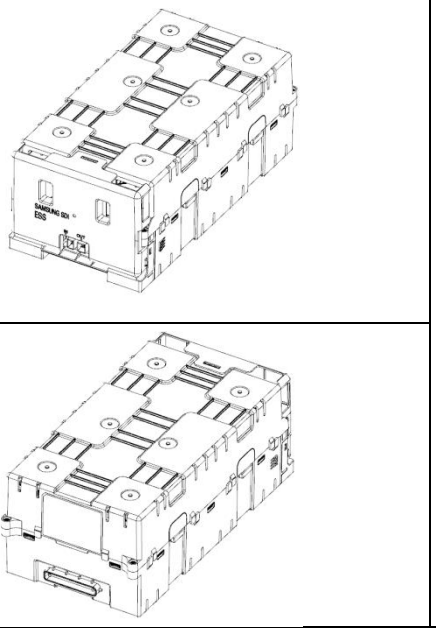
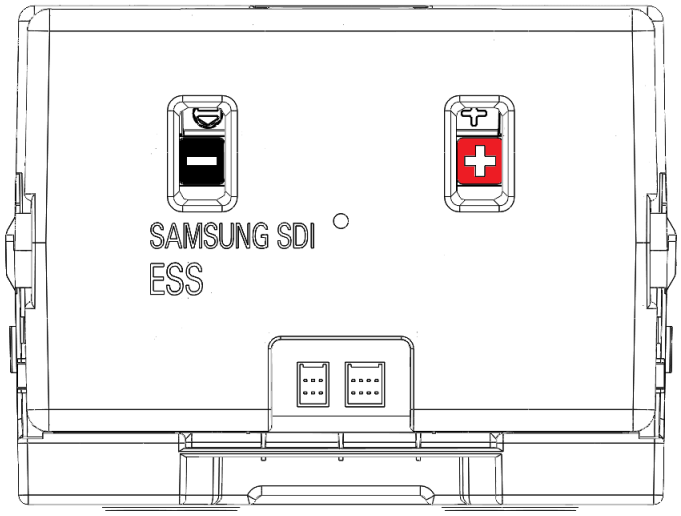
Battery Module Type A (Isometric Front/Rear)	Battery Module Type A (Front)
	

Figure 2-1: Front and Rear Views of the Battery Module Type A

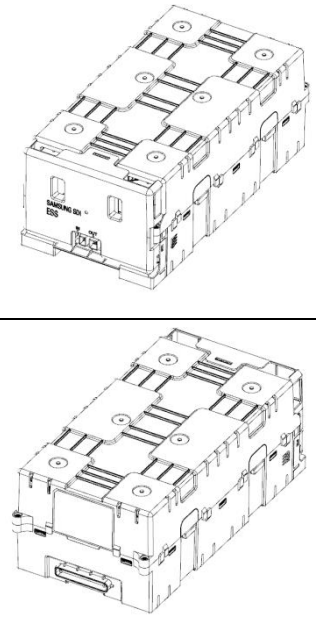
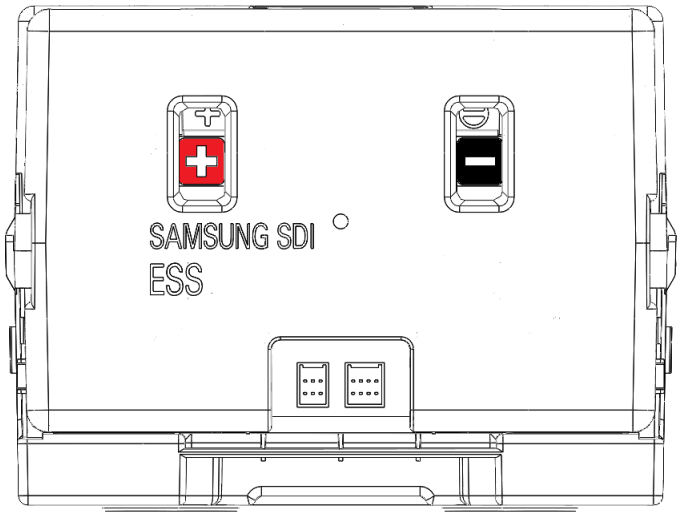
Battery Module Type B (Isometric Front/Rear)	Battery Module Type B (Front)
	

Figure 2-2: Front and Rear Views of the Battery Module Type B

2.1.2 Switchgear Assembly

The Switchgear Assembly consists of a protection circuit and a rack BMS. It is connected to the UPS using the positive and negative power terminals on the front of the switchgear.

- Switchgear Weight: 15 kg (33.07 lb.)
- Switchgear Dimensions (L x W x H): 583 mm x 235 mm x 411- mm (22.95 in. x 9.25 in. x 16.18 in.)

Following are front and rear views of the Switchgear Assembly and the Rack BMS Assembly.

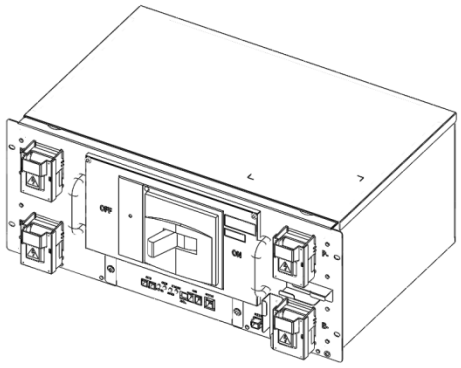
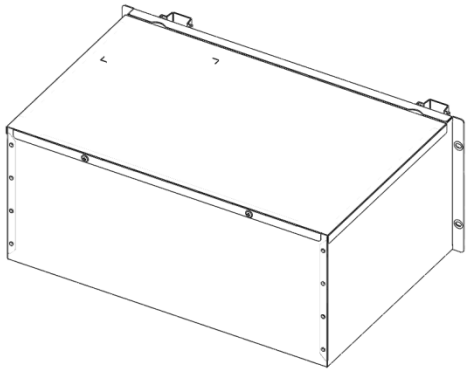
Front Switchgear Assembly	Rear Switchgear Assembly
	

Figure 2-3: Front and Rear Views of Switchgear Assembly

The switchgear provides an auxiliary breaker switch that can be connected to the building monitoring system.

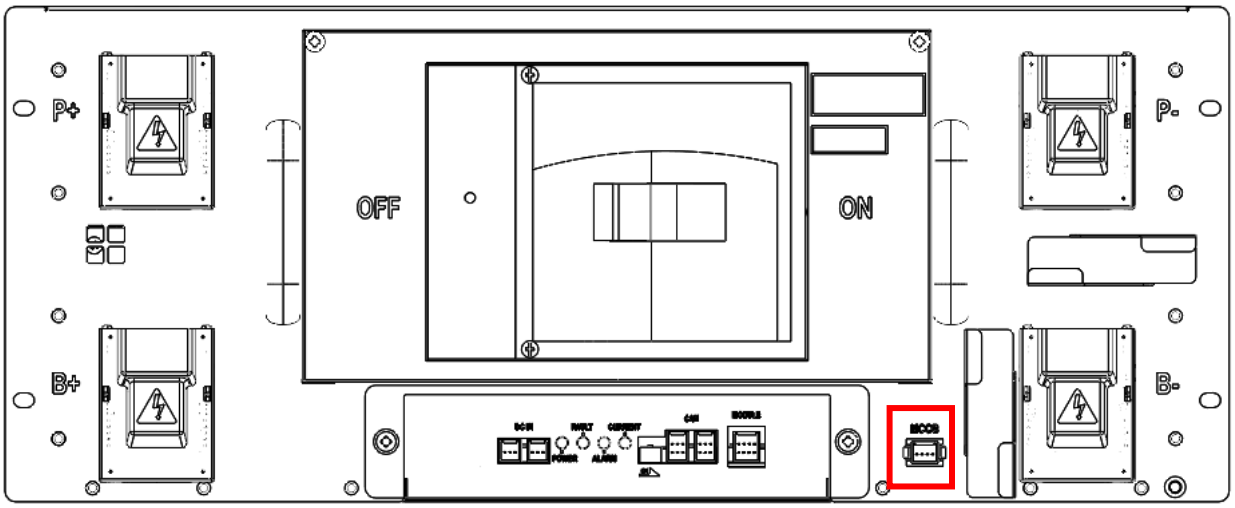


Figure 2-4: Auxiliary Breaker Switch

2.1.3 SMPS Assembly (Type A / Type B)

The system BMS assembly provides data to the external systems (e.g., building management system, UPS, etc.) while controlling and monitoring all connected Rack BMS's.

There are two types of SMPS Assemblies. The model number for each type is classified by whether a System BMS is included. Type A has a System BMS and Type B does not.

- Weight:
  Type A: 5 kg (11.02 lb.)
  Type B: 5 kg (11.02 lb.)
- Dimension (L x W x H): 397.00 mm x 338.00 mm x 86.00 mm (15.63 in x 13.31 in x 3.39 in)

Following are front and rear views of the SMPS Assembly:

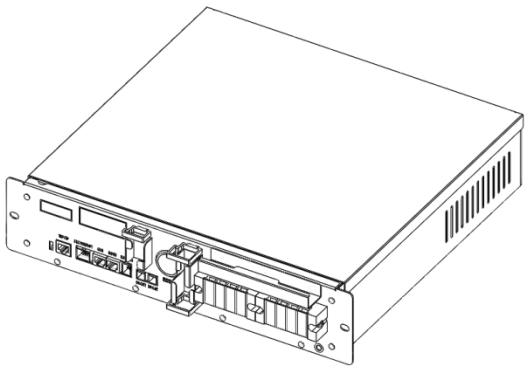
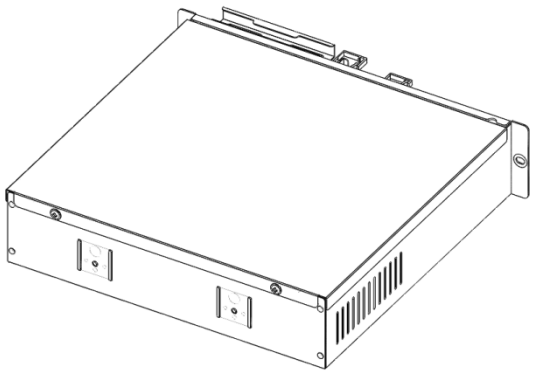
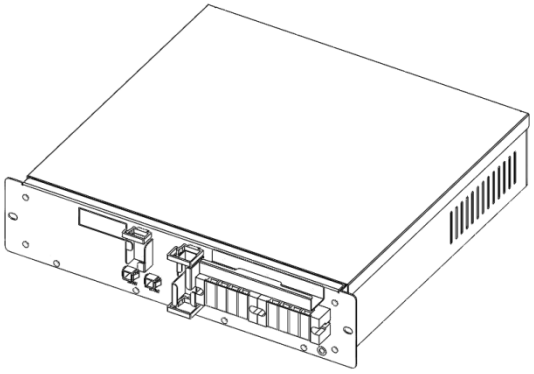
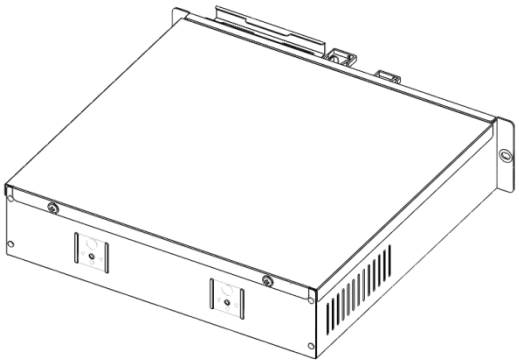
SMPS Assembly (Isometric Front)	SMPS Assembly (Isometric Rear)
	
Type A (with System BMS)	
	
Type B (without System BMS)	

Figure 2-5: Front and Rear Views of the SMPS Assembly

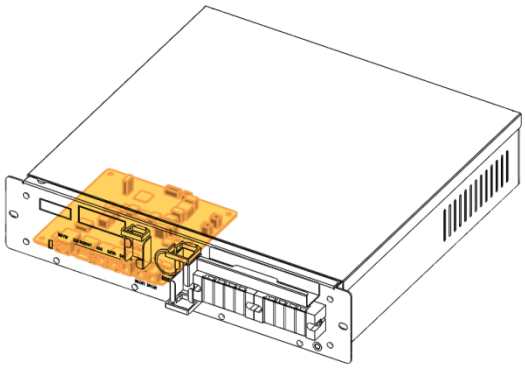
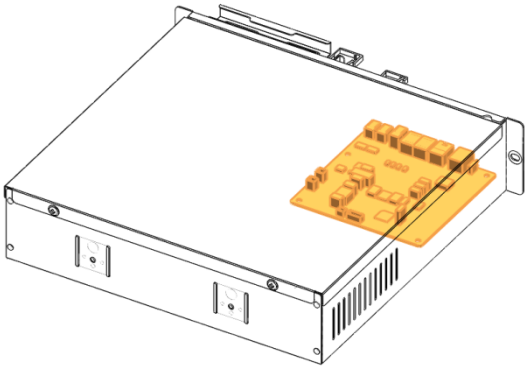
Front System BMS	Rear System BMS
	

Figure 2-6: Front and Rear Views of the System BMS

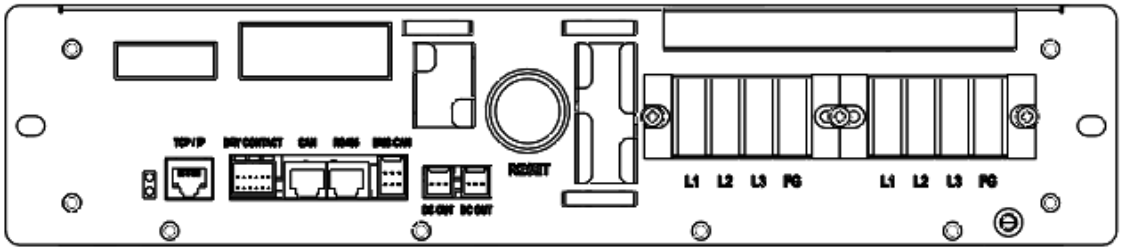


Figure 2-7: Front View of SMPS Assembly, Type A

2.1.4 Rack Frame

The Rack Frame is used to mount the modules, switchgear and SMPS assembly. It facilitates grounding the installed components. (Grounding cable/busbar for the rack frame is necessary for the switchgear and SMPS assemblies because they are grounded to the rack frame when installed. An equipment grounding conductor is required to ground the rack frames together and to the UPS module.

- Weight: 190 kg (418.87 lb.)
- Dimension (L x W x H): 650 mm x 600- mm x 2055 mm (25.59 in. x 23.62 in. x 80.90 in.)

Below are front and rear views of a rack frame.

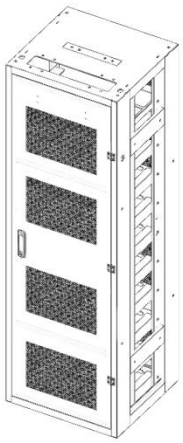
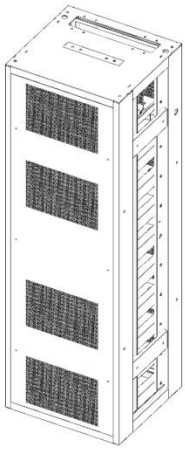
Front Rack Frame	Rear Rack Frame
	

Figure 2-8: Front and Rear Views of the Rack Frame

3. Installing the Product

Because this product has a battery with more than 300V present when fully assembled, you must follow the general safety Instructions. This system must be installed by qualified, trained workers familiar with the required instruments. Use appropriate lifting methods when moving the batteries.

	WARNING
	▪ The power terminal cap must be left in place on the power terminal of the tray for insulation. ▪ Be sure to use insulated tools (torque wrench, extension, socket, etc.). ▪ All the instruments must be insulated and no metal articles (e.g. watch, ring) should be present in the installation area. ▪ All power switches must be turned off in advance. ▪ Prepare a CO_2 fire extinguisher, a first aid kit, and an AED (automated external defibrillator) before installation.

	CAUTION
	▪ If available, use a mechanical lift for lifting heavy (22 kg [50 lb.]) components. If there is no lift, two or three workers must move items weighing more than 22 kg (50 lb.). ▪ The ambient temperature range must be 23°C ±5°C during installation.

3.1 Grounding the Battery System

WARNING—SHOCK HAZARD

Verify with a voltmeter that no power is present on the system before beginning work on the battery system or other part of the UPS system. Use lock out/tag out procedures to secure the UPS and batteries Do not contact system connectors or terminals. Follow all applicable safety measures.

Follow all local and national codes and regulations.

Grounding methods and wiring must comply with NEC Article 250.

Grounding is required to prevent electric shock hazards and reduce or eliminate damage caused by electrical noise. Ground connections and ground wire routing vary significantly depending on system configuration and equipment layout. Samsung provides two grounding strips on each rack, one on top of the rack and the other on the bottom of the rack. See Figure 3-108: Grounding Points (2 EA).

3.2 Installation Procedure

This product must be installed by following the procedure below:

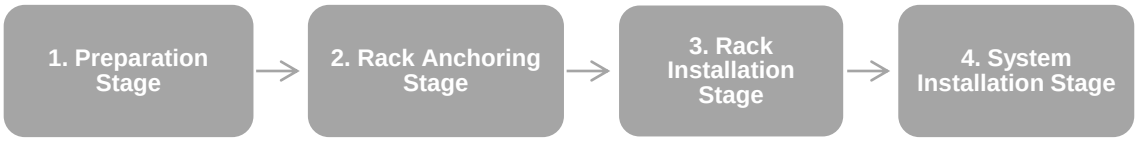


Figure 3-1: Installation Procedure

- **Preparation Stage**
  - Procedure
  - Unpacking
  - Ground Wire and Tools
  - Recommended Tools/Instruments
  - Appearance Inspection
- **Rack Anchoring Stage**
  - Transport the rack frame to the installation location after unpacking
  - Arrange the rack frame after checking the positions of holes in the frame and anchoring points
  - Perform the anchoring and ground connections
- **Rack Installation Stage**
  - Transport the battery modules to the installation location
  - Place the battery modules in the rack frame
  - Insert the Switchgear Assembly in the rack frame
  - Insert the SMPS Assembly in the rack frame
  - After all subassemblies are inserted in the rack frame, attach the subassemblies to the rack frame
  - Connect the busbars
  - Connect the signal cables from switchgear to module, and module to module
  - Connect the signal cables from switchgear to switchgear
- **System Installation Stage**
  - Connect the SMPS Assembly
  - Perform installation checks
  - Prepare the items for BMS configuration
  - Configure the BMS EEPROM settings

Estimated time for each step is listed below.

Table 3-1: Estimated time for installation (based on 128S 3P installation)

No.	Step		Estimated Time (HH:MM)	Aggregated Time (HH:MM)
1	Unpacking		00:30	00:30
2	Inspection		01:00	01:30
3	Rack Anchoring		04:00	05:30
4	Rack Installation	Battery Module	00:20	05:50
		Switchgear Assembly	00:10	06:00
		SMPS Assembly	00:10	06:10
		Busbar	01:00	07:10
		Signal Cables	00:20	07:30
		Power and Control Cables	00:20	07:50
		Rack Fuse Installation	00:30	08:20
		AC Input Installation	00:20	08:40
		Cable Installation	00:10	08:50
		BMS Configuration	00:10	09:00

3.3 Preparation Stage—Procedure

For the preparation stage, perform the following steps:

1. Create the installation plan and check the equipment and instruments for installation.
2. Check the arrival schedule of the parts required.
3. Unpack the equipment.
4. Inspect the equipment.

WARNING

- Do not wear watches, rings, jewelry, or any other metal objects.
- Wear electrically insulated gloves and safety shoes.

CAUTION

- Store the product in a dust-free place with the moisture level of below 60% and the temperature level of 23°C ±5°C.
- Keep components out of direct sunlight.

3.4 Preparation Stage—Unpacking

Check the following parts during unpacking:

Table 3-2: Parts for 136S 3P Rack

No.	Items	Part No.	Amount (Unit: EA)	Remarks
1	RACK FRAME	SJ94-00265B (UL) SJ94-00265F (CE)	3	Remove side covers from between frames bolted together.
2	BATTERY MODULE Type A	ELPM182-00001	24	
3	BATTERY MODULE Type B	ELPM182-00002	27	
4	SWITCHGEAR	ELPJ513-00002 (UL) ELPJ513-00003 (CE)	3	
5	SMPS ASSEMBLY Type B	ELPD131-00002	2	For Rack #2, #3
6	SMPS ASSEMBLY Type A (WITH SYSTEM BMS ASSEMBLY)	ELPD131-00004	1	For Rack #1
7	BUSBAR_BUSBAR M TO SG	SJ66-00927A	6	Connect Module and Switchgear.
8	BUS-BAR MAIN	SJ66-00863A	45	High Current Connection for Modules
9	RACKFUSE BUSBAR_R_136S	SJ66-00868A	3	Connect Module between #8 and #9.
10	RACKFUSE BUSBAR_L_136S	SJ66-00876A	3	Connect Module between #8 and #9.
11	FUSE	3601-001835	3	Connect Module between #8 and #9.
12	FUSE COVER	SJ63-00101A	3	-
13	WIRE ASSY RACK TO MODULE SHIELDING	SJ39-00472A	3	Connect Module and Switchgear.
14	WIRE ASSY MODULE TO MODULE #1	SJ39-00673A	45	Signal Connection for Modules
15	WIRE ASSY RACK TO RACK #2	SJ39-00674A	2	Connect Rack between #1, #2 and #3.
16	WIRE ASSY RACK TO SYSTEM	SJ39-00719A	1	Connect the Rack BMS CAN B to System BMS CAN A connector in the SMPS ASSEMBLY.
17	WIRE ASSY RACK TO SMPS	SJ39-00718A	6	Connect the Rack BMS DC IN to SMPS ASSEMBLY DC OUT
18	WIRE ASSY MODULE TO MODULE #2	SJ39-00678A	3	Signal Connect Module between #8 and #9
19	WIRE ASSY EARTH	SJ39-00725A	6	Connecting SMPS Assembly and Switchgear to Rack Frame.
20	SCREW M5 X 10	SJ60-00068A	30	Mounting SG, SMPS, and WIRE ASSY EARTH to Rack Frame
21	SCREW M8 X 17	SJ60-00152A	102	Mounting Busbar to Module
22	SCREW M12 X 25	SJ60-00138A	12	Mounting Busbar to Switchgrear
23	SCREW M12 X 16	SJ60-00137A	6	Mounting Rackfuse Busbar to Fuse
24	SCREW M10 X 25	SJ60-00082A	8	Mounting Rack Frame to Rack Frame side by side
25	NUT M10	SJ81-01208A	8	Mounting Rack Frame to Rack Frame side by side
26	M10 FLAT WASHER	SJ60-00073A	8	Mounting Rack Frame to Rack Frame side by side

3.5 Preparation Stage—Ground Wire and Tools

Ground wires for the racks must be provided by the installer. Installer-supplied ground wires must meet the specifications below.

Refer to 3.1 Grounding the Battery System for details on grounding.

3.5.1 Ground Wires

Use ground wire that is 70 sq mm. The ground wire specifications are:

Table 3-3: Ground Wire Specifications[1]

Wire No.	Terminal Type
70 sq mm or thicker	M12 2 Hole Ring Terminal

3.5.2 Ground Wire Fasteners

Specifications for the ground wire fastening screws are:

Table 3-4: Ground Wire Fastener Specification[2]

Size	Hardness	Thread Pitch	Material
M12–30L	70 (Grade 7)	1.25 mm (0.05 in)	SS304

3.5.3 Rack Fasteners (Anchors)

Specifications for the rack fastener screws for anchoring the rack frame to the floor are:

Table 3-5: Rack Fastener Specifications[3]

Size	Hardness	Thread Pitch	Material
M16–L (Bottom Anchor)	70 (Grade 7)	2.0 mm (0.08 in)	SS304

3.5.4 Multiple Rack Fasteners

Rack fasteners are factory-provided. Refer to Table 3-2: Parts for 136S 3P Rack for part number and quantities.

Specifications for the rack fastener screws for installing multiple rack frames side-by-side are:

Table 3-6: Rack Fastener Specifications (Side by side)

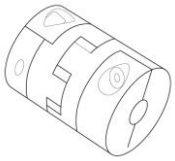
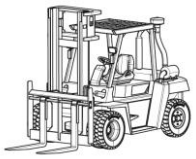
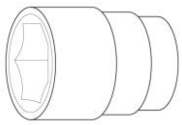
Size	Hardness	Thread Pitch	Material
M10–25L (Side)	70 (Grade 7)	1.5 mm (0.06 in)	SS304

[1] Not provided. Must be provided by the installer or customer.
[2] Not provided. Must be provided by the installer or customer.
[3] Not provided. Must be provided by the installer or customer.

3.6 Preparation Stage—Recommended Tools/Instruments

Installers must provide these tools for installing the battery:

Table 3-7: Recommended Tools and Instruments

No.	Items	Usage	Appearance
1	Power Screwdriver/Drill (Max torque: 26Nm/270 kgf/cm)	To fasten switchgear and SMPS assemblies to the rack frames (5.1–6.1Nm/50–60 kgf/cm)	
2	Torque Limiter	For use with torque wrench	
3	Phillips Screwdriver or Bit	To fasten switchgear and SMPS assemblies to the rack frames (M5 Tip)	
4	Box Cutter	Opening boxes	
5	Forklift	Moving rack frames and pallets containing modules and switchgear	
6	Insulated Torque Wrench	Installing a high-current cable (10~50 N.m / 100 ~ 500 kgf.cm)	
7	Insulated Sockets (13 mm, 17mm and 19mm)	Installing power cables and busbars	
8	Insulated Extension for Socket	Installing a power cable	
9	Inclinometer/Level	Installing a rack frame	

No.	Items	Usage	Appearance
10	Battery Tester	Measure battery module's voltage and internal impedance	

3.7 Preparation Stage—Visual Inspection

During visual inspection, the inspector should check for:

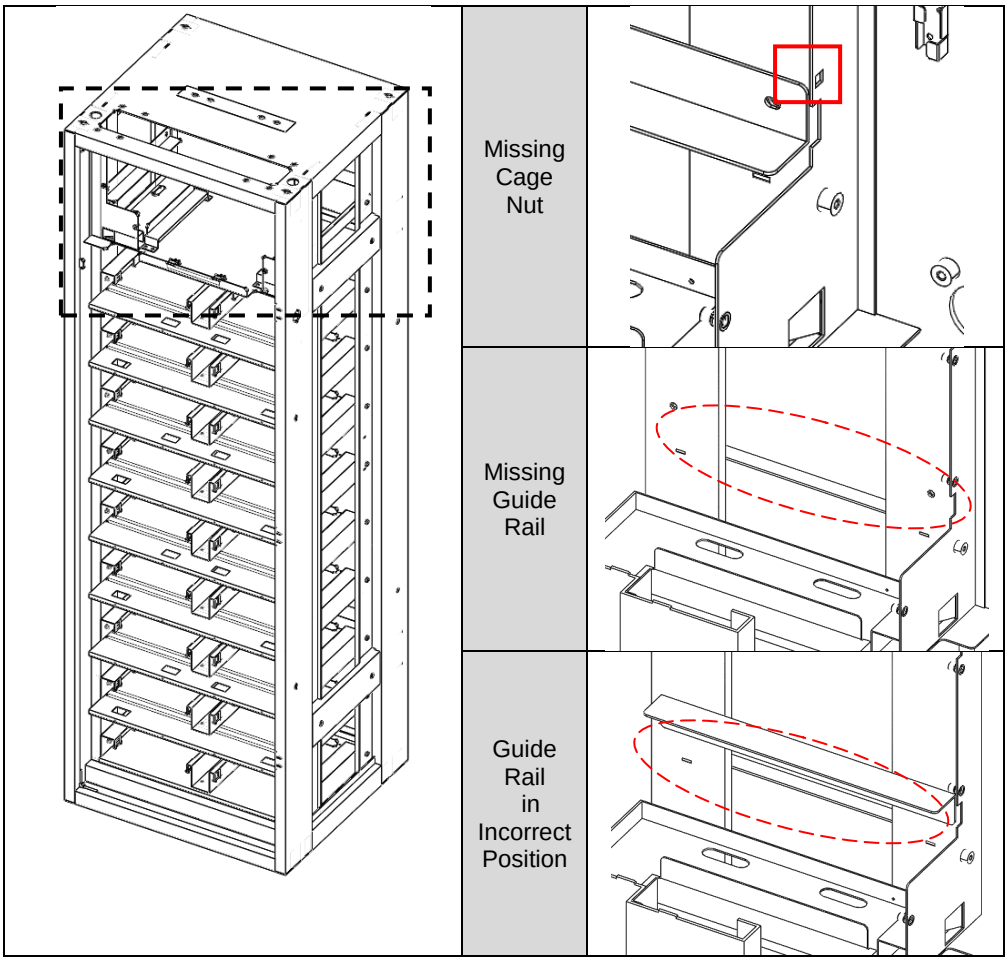


Figure 3-2: Faulty Cases

	CAUTION
	▪ If any defects are found during the inspection, contact the SAMSUNG SDI customer service department.

3.7.1 Inspecting the Rack Frame

After transporting the rack frame to the installation location, check for:

- Structural damage
- Paint peeling
- Damaged or protruding screws.

After completion, install or package the rack for protection during storage.

3.7.2 Visual Inspection of the Modules

After transporting the modules to the installation location, check for:

- Physical damage to the exterior
- Damaged or protruding screws
- Proper voltage and internal impedance of the battery modules using the battery tester.

Table 3-8: Module Voltage and Internal Impedance

No.	Items	Value
1	Voltage Check	28.712 ~ 29.104V
2	Internal Impedance Check	3.0 ~ 4.3 mΩ

After completion, install the battery module in the previously installed rack or return the battery module to its original packing for protection during storage.

3.7.3 Inspecting the Switchgear

After transporting the Switchgear to its installation location, check for:

- Physical damage
- Paint peeling
- Damaged or protruding screws.

After completion, install the switchgear in the previously installed rack or return the switchgear to its original packing for protection during storage.

3.7.4 Inspecting the SMPS assembly

After transporting the SMPS Assembly to its installation location, check for:

- Physical damage
- Paint peeling
- Damaged or protruding screws.

After completion, install the SMPS in the previously installed rack or return the SMPS to its original packing for protection during storage.

3.8 Rack Anchoring Stage

Install the rack frame on a flat, level surface.

▶ **To attach the rack and perform the related works**

CAUTION

- Use a proper transportation method considering the weight of the rack frame.
- Ensure that the safety of the working place is maintained.
- When using a forklift, lift the rack frame from the front.
- When a forklift cannot be used, use a mechanical lift or move it by hand with three or more people.
- Use lock washers to prevent bolts from loosening.
- Use an inclinometeror carpenter's level to ensure that the rack frame is plumb.

NOTICE

- Failure to anchor the rack frame on a flat and level surface may distort the rack frame after installing the racks side-by-side.
- Frame distortion may make the rack doors difficult or impossible to open.

In order to anchor the racks in all four points, racks are recommended to be placed according to the clearance distances listed in the figures below. In seismically active areas, all four anchor points of the rack must be installed.

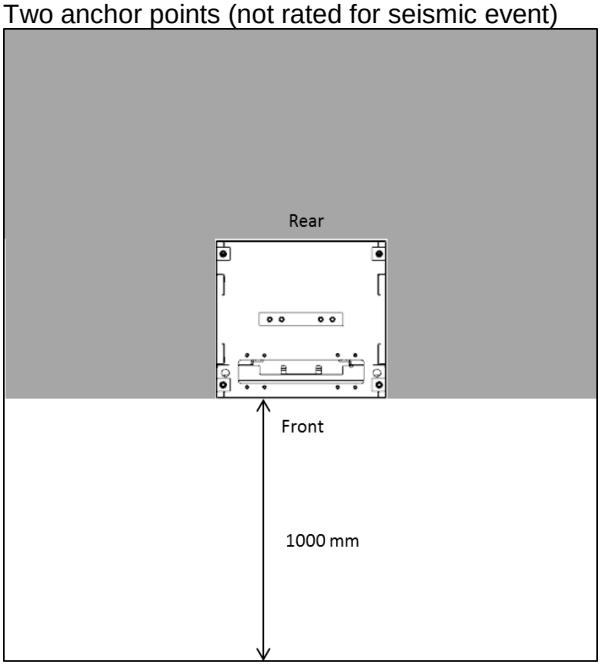
To reduce the product footprint, the racks can be installed side-by-side and rear-to-rear against a wall or next to another rack. In this case, only two anchor points on the front side of each rack can be installed. Proper cooling and ventilation of the installed area is recommended for racks installed with no side and rear clearance. Front side of the rack must be cleared for installation, maintenance, service access, and ventilation and cooling.

Clearance from the top of the rack frame is not required and the top of the rack frame can be covered to prevent any foreign objects from falling into the battery rack frame.

Table 3-9: Rack Clearance Distances

Configuration	Anchor points per rack	Clearance Distance (mm)			
		Side (end)	Side (adjacent)	Rear	Front
Single Rack	2 (Front) not rated for seismic event	0	n/a	0	1000
	4 (All) – Telcordia Zone 3	800	n/a	800	1000
Multiple Racks (Side-to-Side)	2 (Front) not rated for seismic event	0	0	0	1000
	4 (All) – Telcordia Zone 3	800	0	800	1000
Multiple Racks (Side-to-Side and Rear-to-Rear)	2 (Front) not rated for seismic event	0	0	0	1000
	4 (All) – Telcordia Zone 3	800	0	800	1000

Two anchor points (not rated for seismic event)



Four anchor points (Telcordia Zone 3)

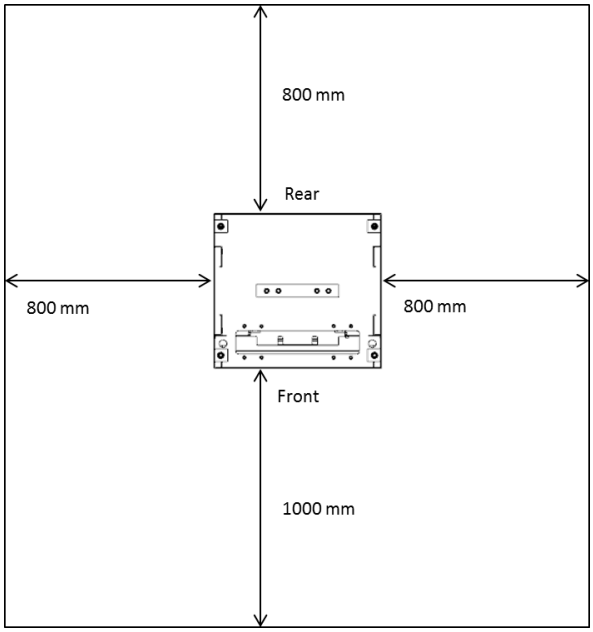
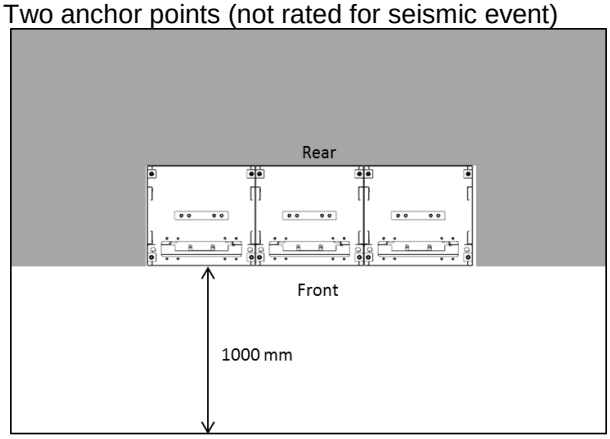


Figure 3-3: Clearance Distance for Single Rack Frame

Two anchor points (not rated for seismic event)



Four anchor points (Telcordia Zone 3)

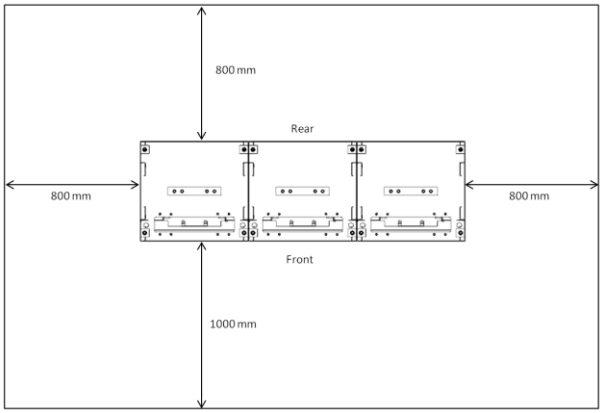
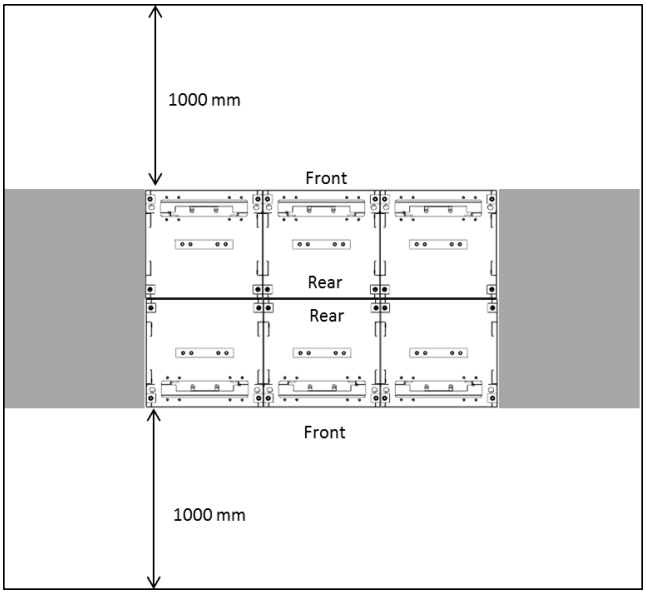


Figure 3-4: Clearance Distance for Multiple Rack Frames

Two anchor points (not rated for seismic event)



Four anchor points (Telcordia Zone 3)

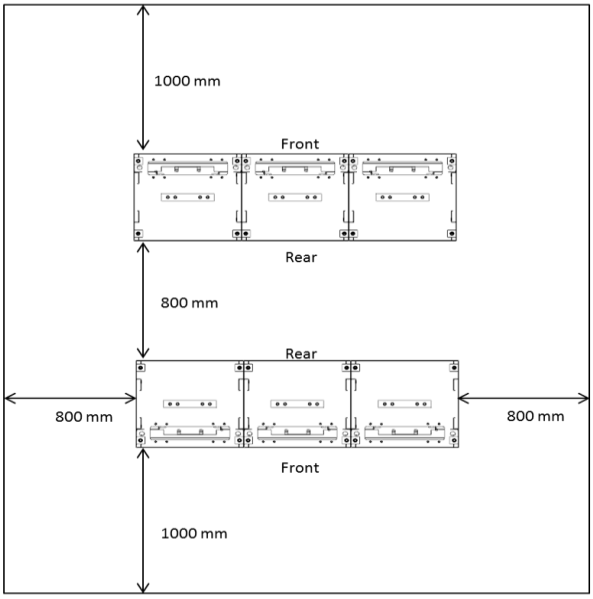


Figure 3-5: Clearance Distance for Multiple Rack Frames Installed Rear-to-Rear

1. After unpacking the rack frame, transport it to its installation location.
2. Arrange the rack frame after verifying that the holes in the frame and anchoring points are aligned.
3. Remove the side panels and rear panel from the rack frame.
4. Connect four anchoring points on the bottom of the rack.

	NOTICE
	▪ Anchor the frame with M16 bolts and nuts. ▪ The fastening torque should be 140Nm / 1,425kgf cm. ▪ Check the rack and other parts for distortion caused by unpacking.

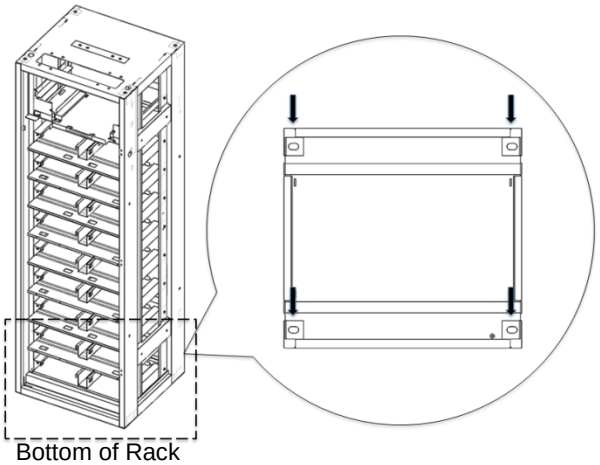


Figure 3-6: Rack Anchoring Points (4 EA)

5. Connect the racks, using M10 hardware through holes in the sides (“SCREW M10 X 25,” “M10 FLAT WASHER” and “NUT M10”). Torque the bolts to 30Nm (300kgf cm).

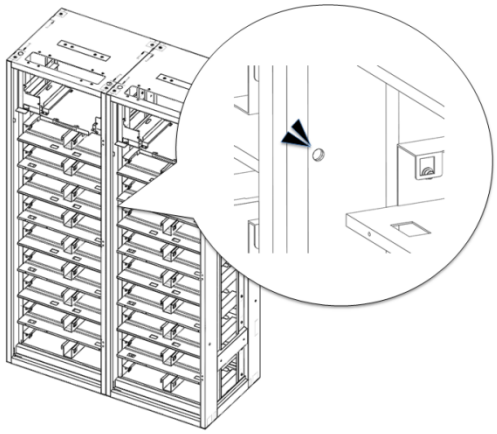


Figure 3-7: Holes on the sides of the rack

6. After all the rack frames are anchored, reattach the side panels to the outermost rack frames using four M5 Screws (“SCREW M5 X 10”) for each side panel. Fasten the screws using torque of 5.1–6.1 Nm (50–60 kgf/cm).

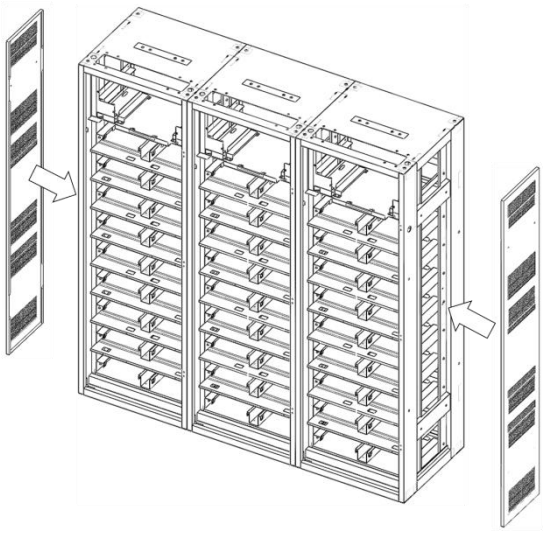


Figure 3-8: Reattaching the Side Panels

7. Reattach the rear panels to the rack frames using four M5 Screws “SCREW M5 X 10” for each rear panel. Fasten the screws using torque of 5.1–6.1 Nm (50–60 kgf/cm).

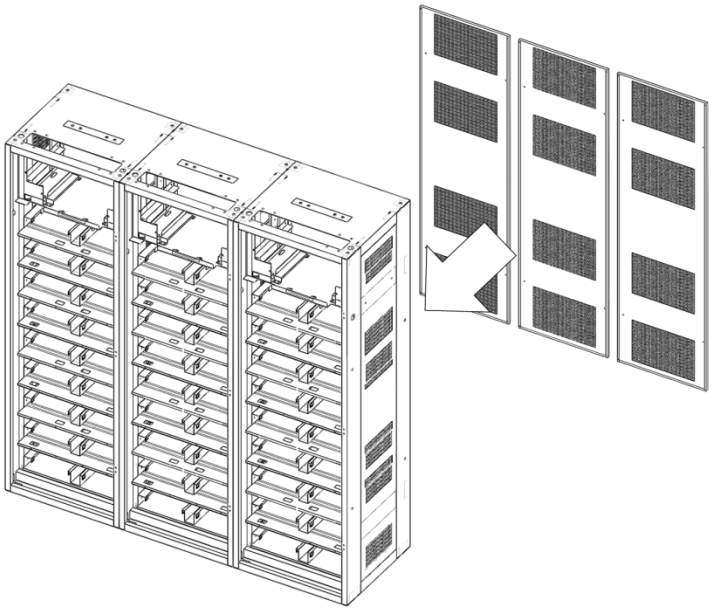


Figure 3-9: Reattaching the Rear Panels

3.9 Rack Installation Stage

WARNING

Arc Flash and Shock Hazard
Insulated tools are required for any work on this energized equipment.

WARNING

Sharp Edges
Wear gloves and other protective gear to prevent injury.

WARNING

Pinch Point
Use caution when working in the enclosure to prevent injury.

CAUTION

Heavy Object
Can cause muscle strain or back injury.
Use lifting aids and proper lifting techniques when moving trays, batteries and other heavy objects.

3.9.1 Switchgear and SMPS Assembly Installation

	Important
	▪ Attach each Switchgear to its rack frame with four M5 x 10L screws. (Torque: 5.1–6.1 Nm [50–60 kgf cm]) ▪ Verify that the torque setting is correct.

1. Insert the Switchgear Assembly through the front of the rack as shown in Figure 3-10: Inserting Switchgear

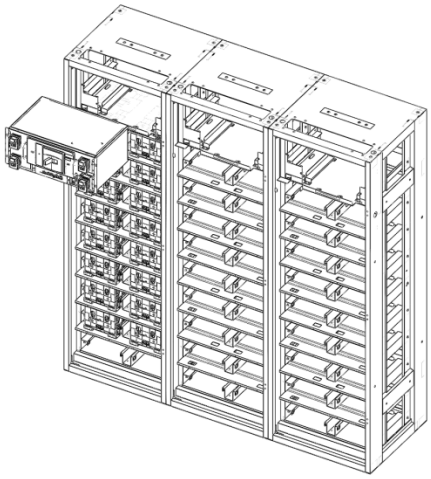


Figure 3-10: Inserting Switchgear

2. After all Switchgear Assemblies are inserted in the rack frames, attach each to the rack frame with four M5 x 10L bolts. (Torque: 5.1–6.1 Nm [50–60 kgf cm])

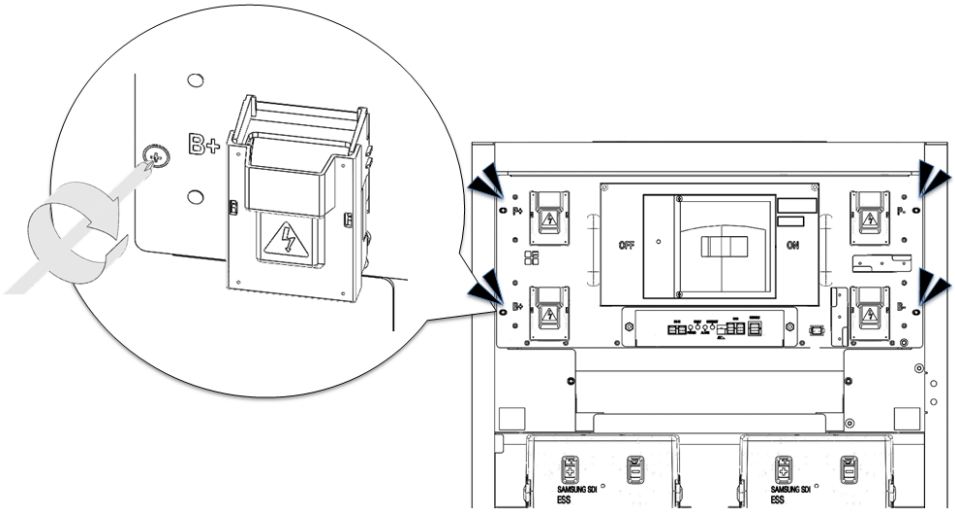


Figure 3-11: Attaching a Switchgear Assembly to a Rack Frame

3. After all Switchgear Assemblies are inserted into the rack frame, connect the ground cable.

	NOTICE
	Connect a ground cable between the Switchgear Assembly and the Rack Frame (SCREW M5 x 10L). (Torque: 5.1–6.1 Nm [50–60 kgf·cm]) ▪ Verify that the torque setting is correct.

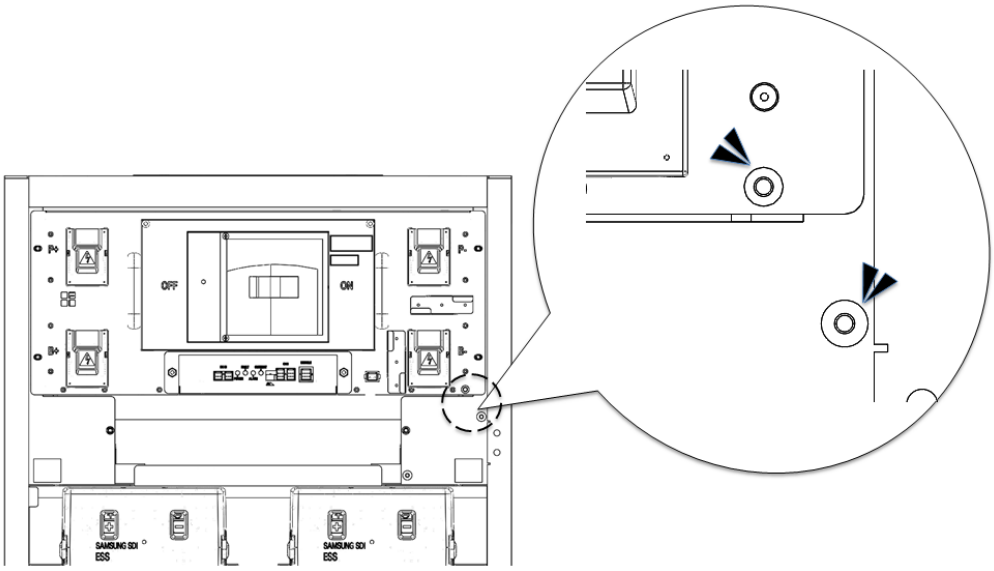


Figure 3-12: Ground Cable Connection to the Switchgear Assembly

4. Insert SMPS Assembly into the rack frames designated for SMPS Assembly as shown in Figure 3-13: Inserting SMPS Assembly

	Important
i	▪ Attach the inserted SMPS Assemblies to the rack frames by fastening each with four M5 x 10Lscrews ▪ (Torque: 5.1–6.1 Nm [50–60 kgf cm]) ▪ Verify that the torque setting is correct.

5. Slide the SMPS Assembly into the rack frame on the shelf designated for the Switchgear Assembly as shown below.

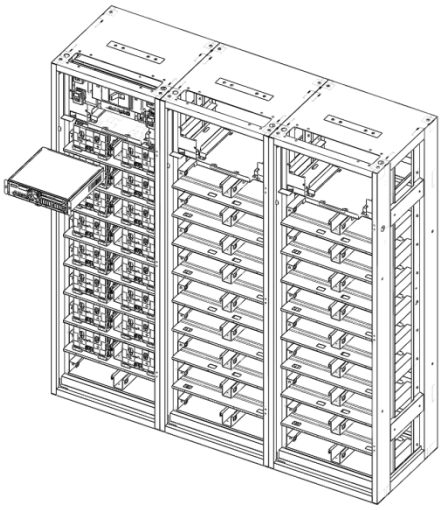


Figure 3-13: Inserting SMPS Assembly

6. After all SMPS Assemblies are inserted into the rack frames, attach them to the Switchgear with screws (Torque: 5.1–6.1 Nm [50–60 kgf cm])

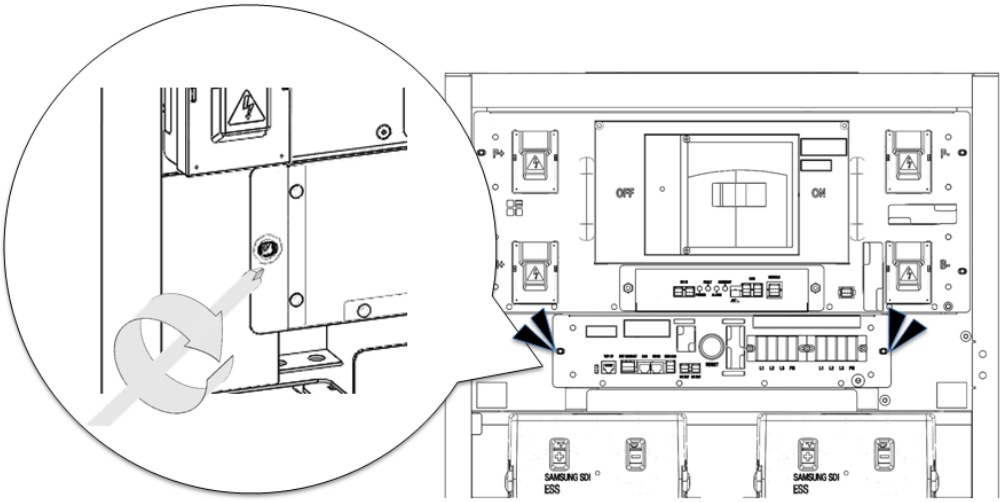


Figure 3-14: Attaching the SMPS Assembly

7. After all SMPS Assemblies are attached to the rack frames, connect the ground cables.

⚠	***NOTICE***
	▪ Connect a ground cable between the SMPS Assembly and the Rack Frame with an M5 x 10L screw. (Torque: 5.1–6.1 Nm [50–60 kgf cm]) ▪ Verify that the torque setting is correct.

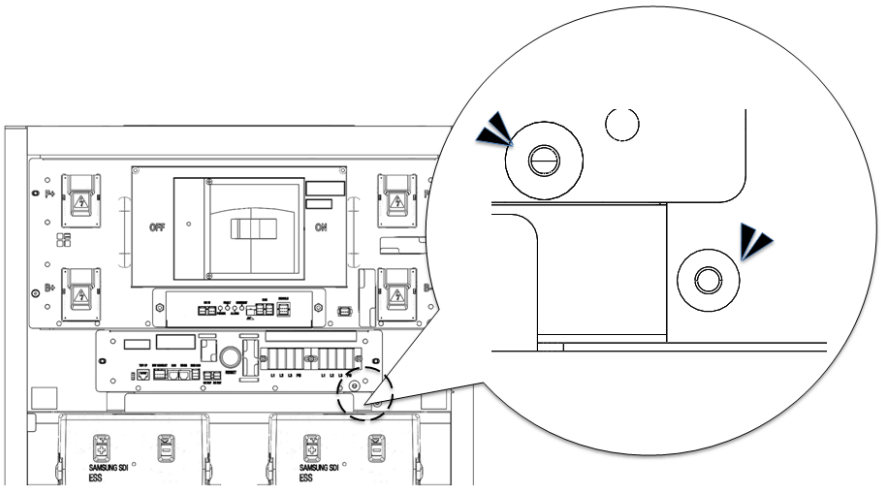


Figure 3-15: Ground Cable Connection to the SMPS Assembly

3.9.2 Battery Module Installation

1. Transport battery modules to the installation location.
2. Measure the modules' voltage and internal impedance. All modules in one rack frame must be near the same state of charge. The batteries must have an output within 300mV of each other and internal impedance difference of 1.3mΩ. Refer to Table 3-8: Module Voltage and Internal Impedance.
3. Place the battery modules on the rack frame.

	Important
i	▪ Samsung recommends installing Battery Modules in the upper shelves first and proceeding to the bottom. (Two Type B battery modules are inserted in the ninth shelf from the bottom.) ▪ Sixteen battery modules can be inserted into a rack frame as shown in Figure 3-18. ▪ Refer to Figure 2-1: Front and Rear Views of the Battery Module Type A and Figure 2-2: Front and Rear Views of the Battery Module Type B for information on the different battery module types.

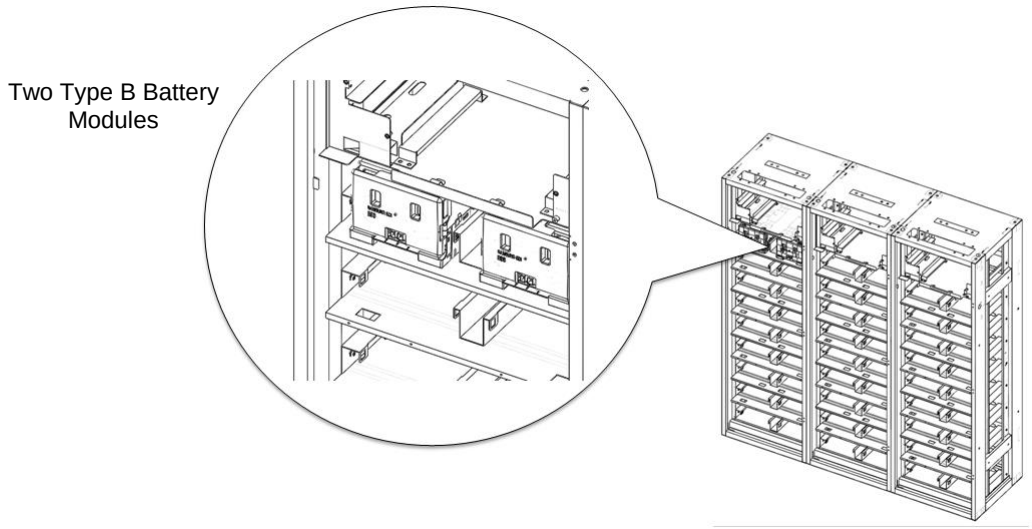


Figure 3-16: Insertion of Modules on the Ninth Shelf from the Bottom

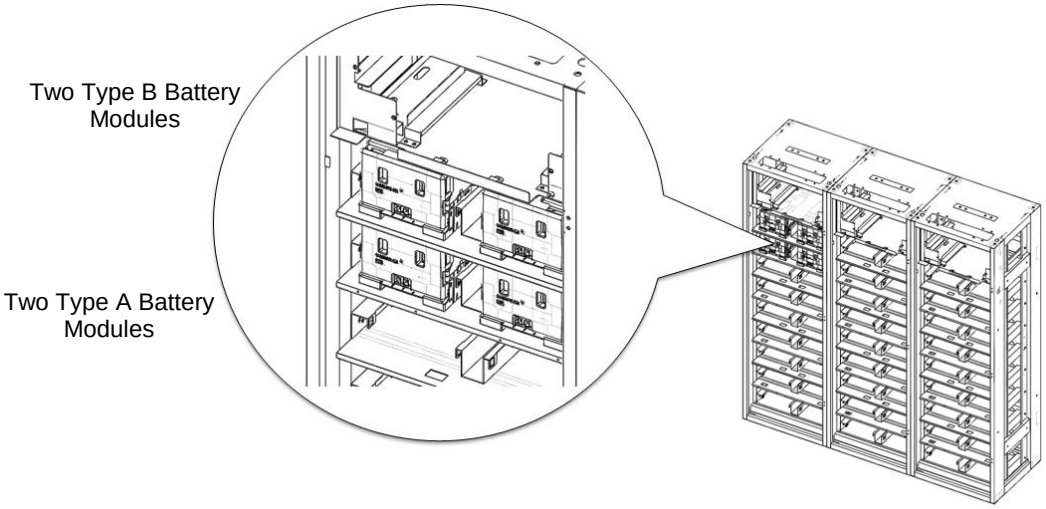


Figure 3-17: Battery Module Arrangement on Eighth and Ninth Shelves

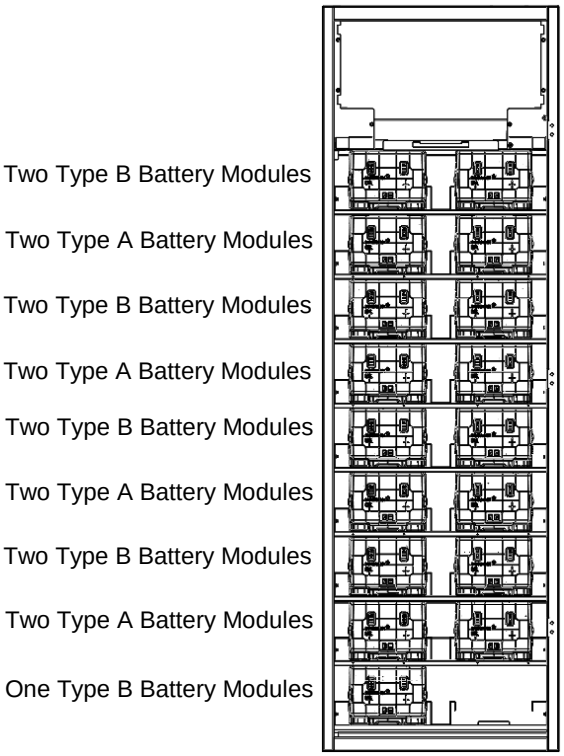


Figure 3-18: Battery Module Arrangement

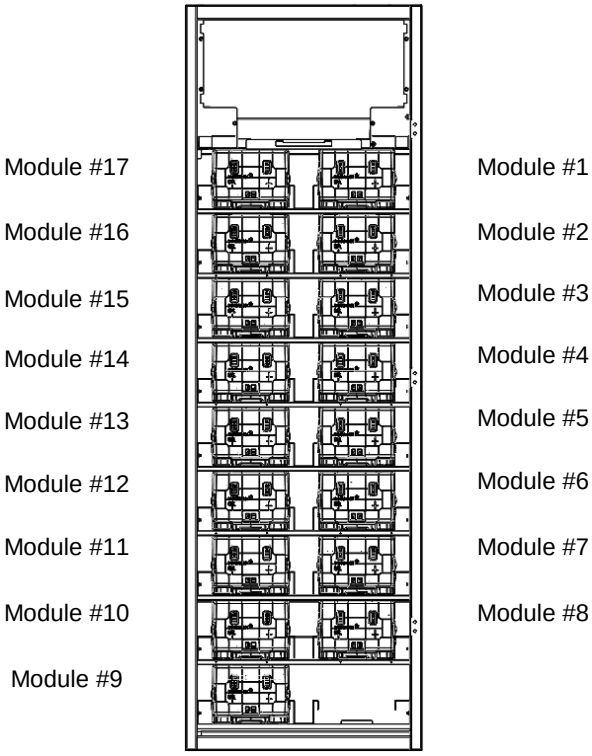


Figure 3-19 : Module Number

	Important
	▪ Samsung recommends installing modules from top to bottom. ▪ The bottom shelf (#1) has one Type B module in the left slot, as shown in Figure 3-20.

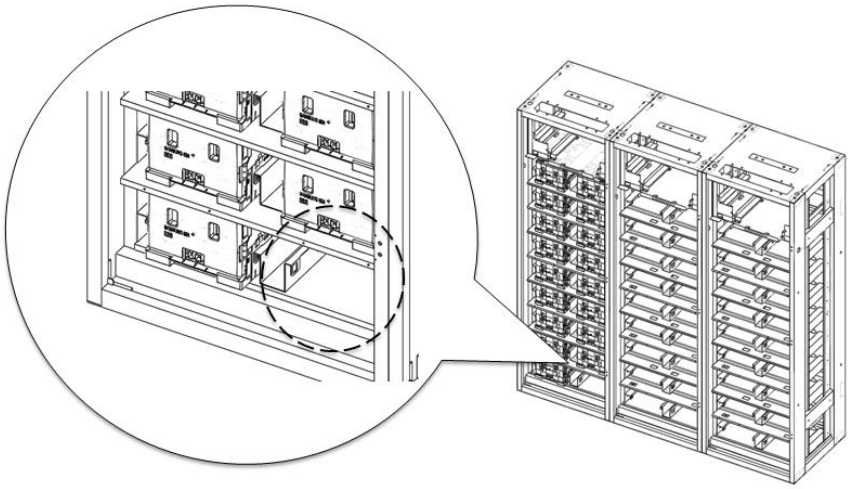


Figure 3-20: Insertion of modules on 1st shelf

3.9.3 Busbar Installation

Connect the power busbars between modules

Verify with a voltmeter that no power is present on the system. Use lock out/tag out procedures to secure the UPS and batteries.

	CAUTION
	▪ Please follow the instructions to protect the module BMS against damage. ▪ Important: DO NOT deviate from the sequence of steps below. ▪ The system's voltage will increase proportionally as battery modules are connected. Exercise extreme caution prevent the terminals from contacting anything except their intended mounting points. ▪ Terminals and their connected wires have either positive or negative polarity (Positive: B+, P+; Negative: B-, P-). The polarity of a terminal or a wire connected to the terminal is on the front of each module and switchgear. Exercise extreme caution to prevent the terminals and/or wires with opposite polarity from contacting with each other. ▪ It is recommended not to touch the battery positive(+) or negative(-) terminal for the batteries with rack frame. There is no evidence of dielectric breakdown because of electrical isolation between the battery positive (+) or negative (-) terminals and rack frame. However, it is recommended not to touch them for safety because It is possible to touch between battery positive (+) and negative (-) through the rack frame.

	NOTICE
	▪ Connect the power busbar with an M8 screw for battery module terminals ▪ The fastening torque should be 8.16–11.94 Nm (80–117 kgf/cm). ▪ Use an insulated torque wrench extension with a 13 mm socket.

	NOTICE
	▪ Connect the power bus-bar with an M12 screw for switchgear terminals ▪ The fastening torque should be 30 Nm/300 kgf·cm. ▪ Use an insulated torque wrench extension with a 19 mm socket.

	Important
	▪ The power terminals, such as "B+," "B-," "P+," and "P-," of the module and Switchgear are covered with the power terminal cover to guard against a short circuit. ▪ At each step in this process, you must remove the cover prior to connecting a power busbar and reattach the cover immediately after connecting the power busbars.

1. Remove Battery Module #1's front cover and the Switchgear B- terminal cover.

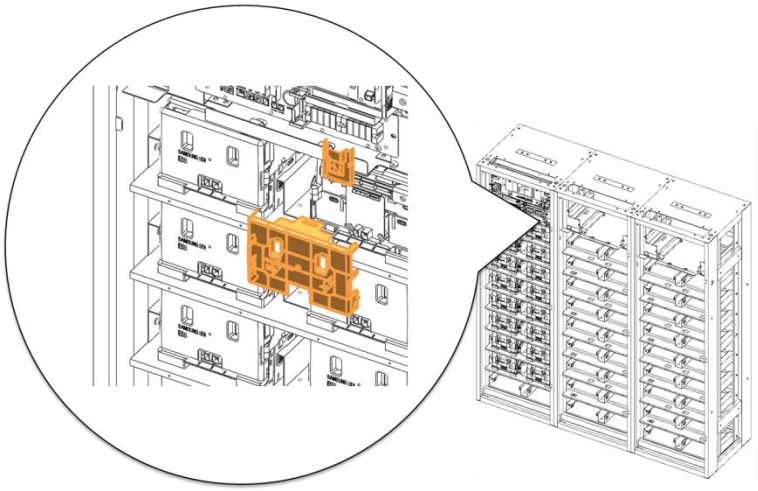


Figure 3-21: Removing the Module #1's Cover and Switchgear B- Terminal Cover

2. Connect Switchgear B- and Module #1 B- using "BUSBAR_BUSBAR M TO SG." Switchgear B- terminal is connected using an M12 screw and Battery Module #1 B- terminal is connected using an M8 screw.

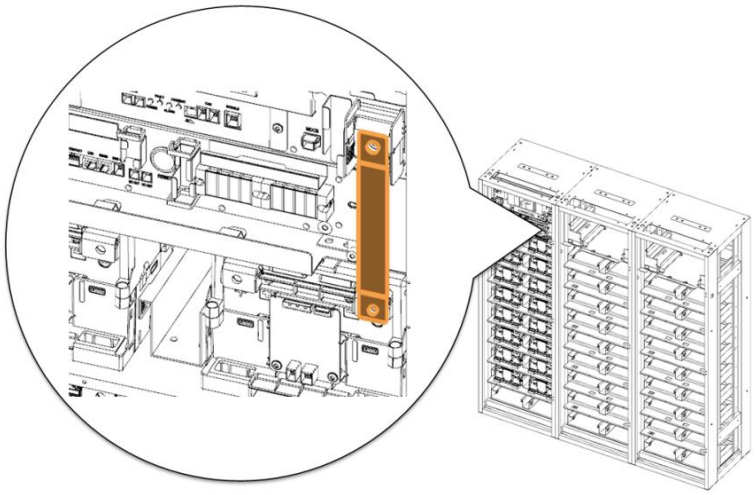


Figure 3-22: Connect Switchgear B- and Module #1 B-

3. Reattach Switchgear's B- terminal cover.

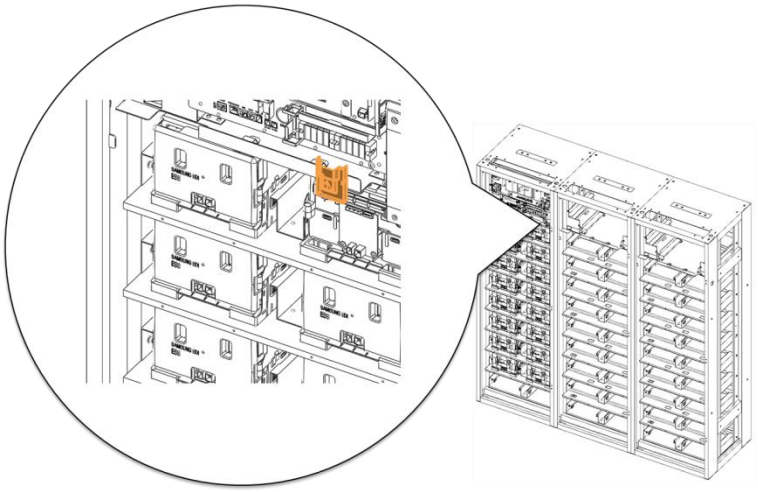


Figure 3-23: Restore Switchgear's B- Terminal

4. Remove Battery Module #2's front cover.

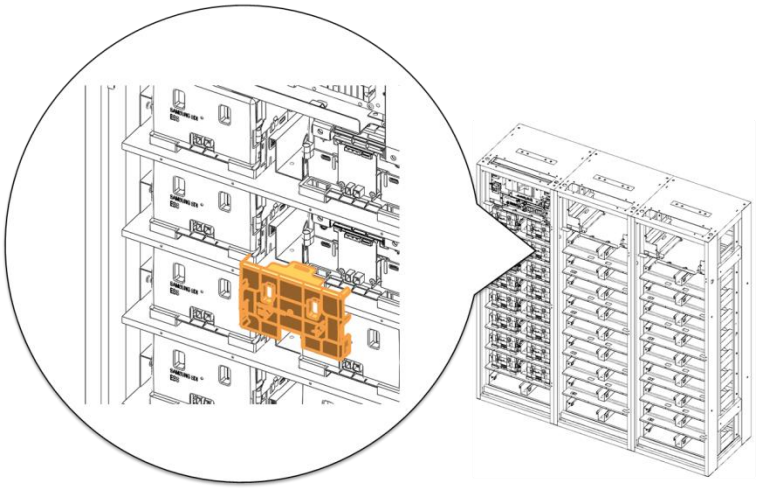


Figure 3-24: Remove Battery Module #2's Front Cover

5. Connect Battery Module #1 B+ and Module #2 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

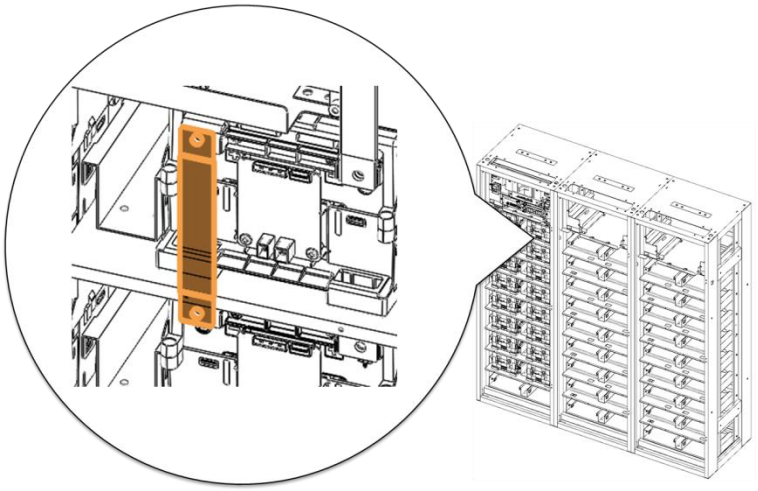


Figure 3-25: Connect Battery Module #1 B+ and Battery Module #2 B-.

6. Reattach Battery Module #1's front cover and remove Battery Module #3's front cover.

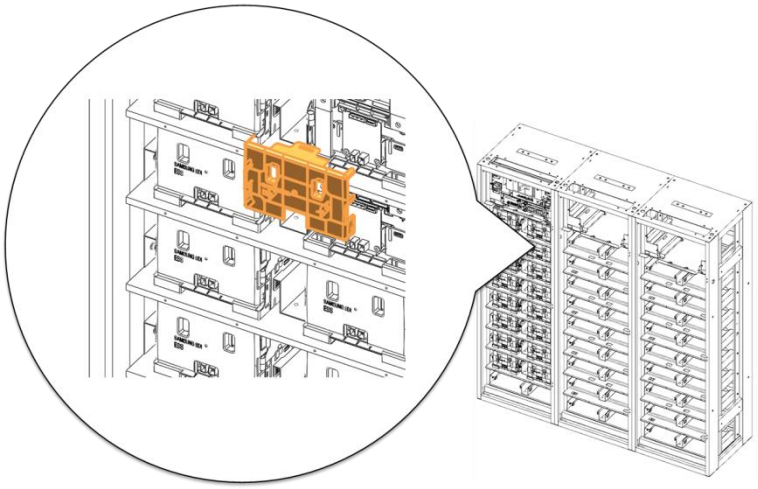


Figure 3-26: Reattach Battery Module #1's Front Cover

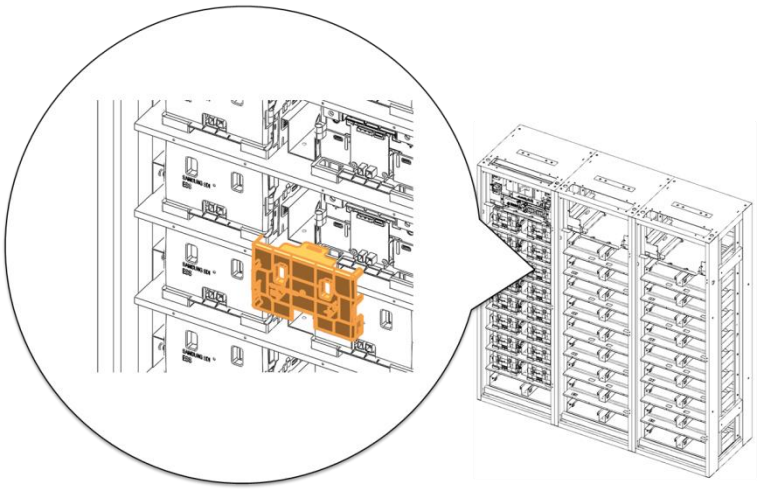


Figure 3-27: Remove Battery Module #2's Front Cover

7. Connect Battery Module #2 B+ and Battery Module #3 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

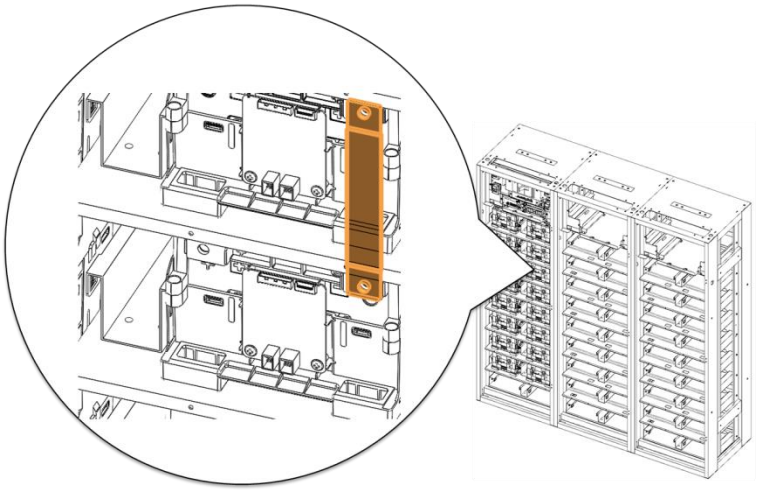


Figure 3-28: Connect Battery Module #2 B+ and Battery Module #3 B-.

8. Reattach Battery Module #2's front cover and remove Battery Module #4's front cover.

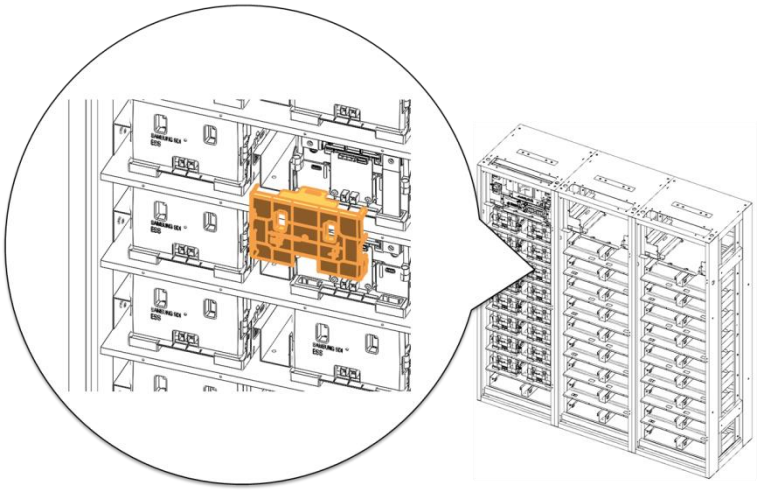


Figure 3-29: Reattach Battery Module #2's Front Cover

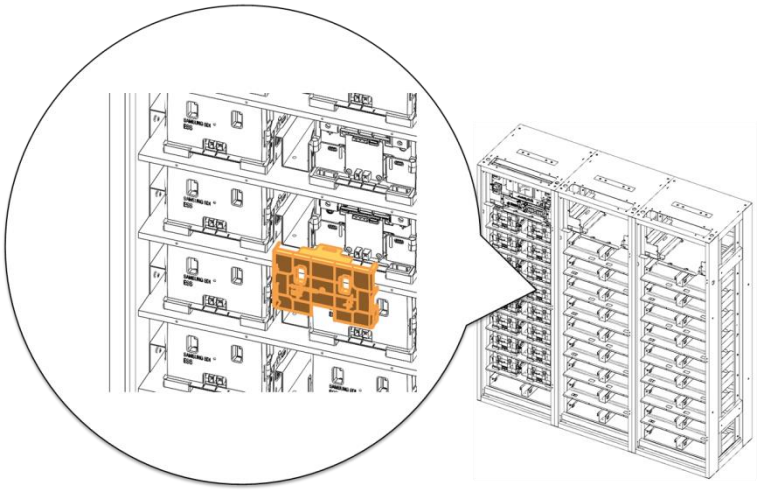


Figure 3-30: Remove Battery Module #4's Front Cover

9. Connect Battery Module #3 B+ and Module #4 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

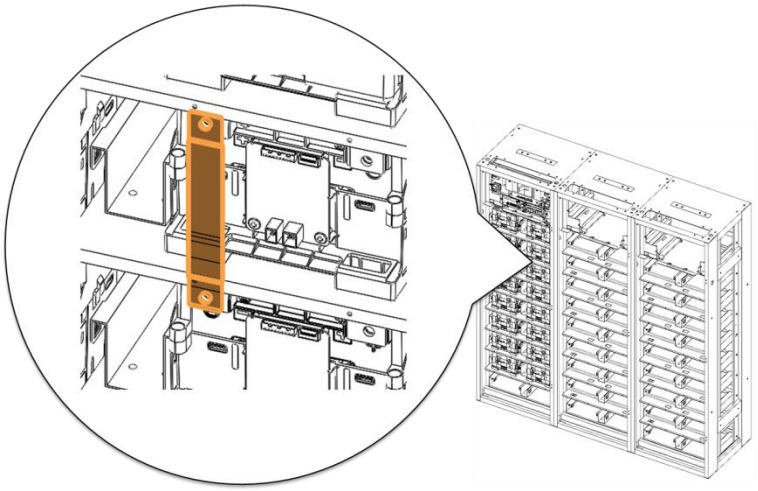


Figure 3-31: Connect Battery Module #3 B+ and Module #4 B-.

10. Reattach Battery Module #3's front cover and remove Battery Module #5's front cover.

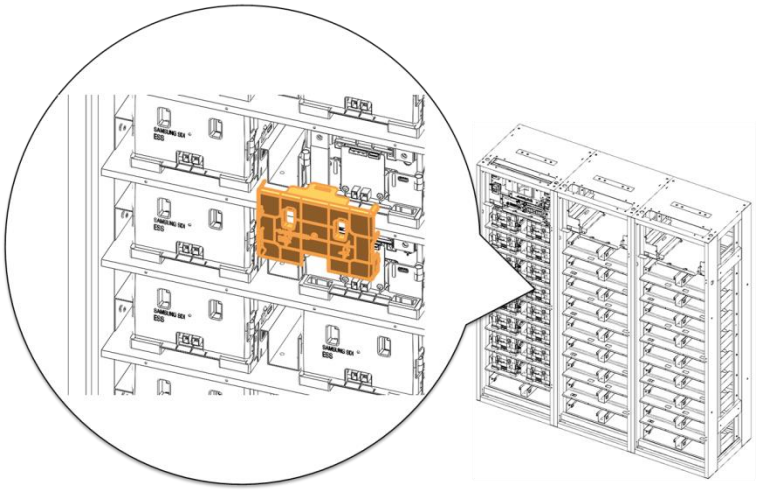


Figure 3-32: Reattach Battery Module #3's Front Cover

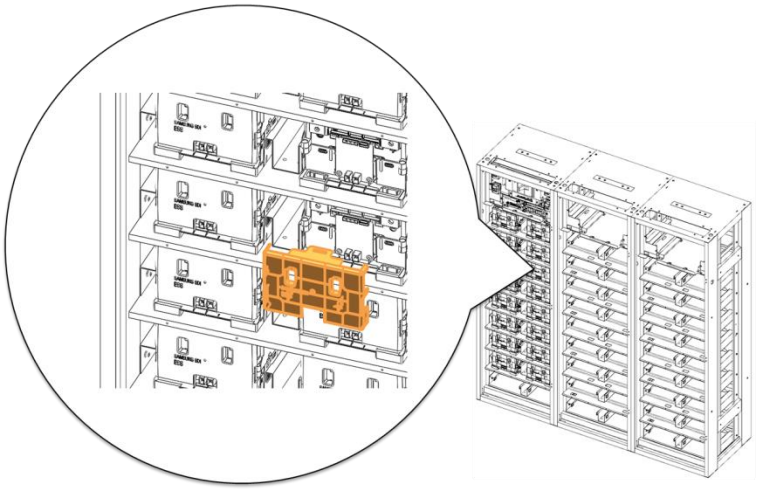


Figure 3-33: Remove Battery Module #5's Front Cover

11. Connect Battery Module #4 B+ and Battery Module #5 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

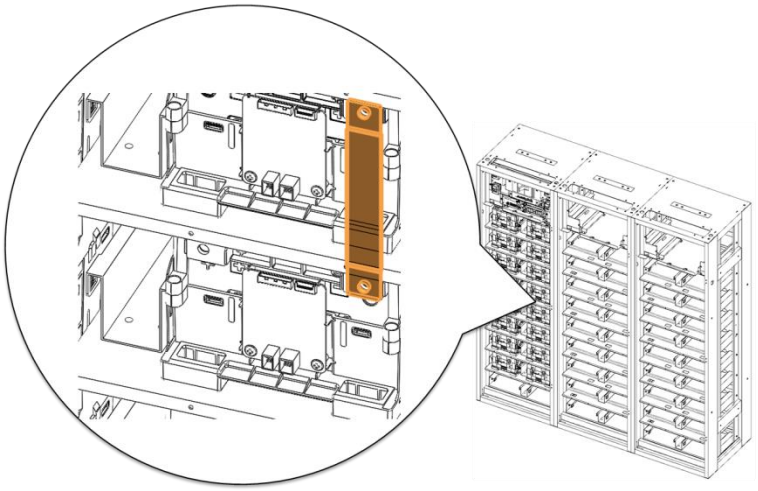


Figure 3-34: Connect Battery Module #4 B+ and Battery Module #5 B-.

12. Reattach Battery Module #4's front cover and remove Battery Module #6's front cover.

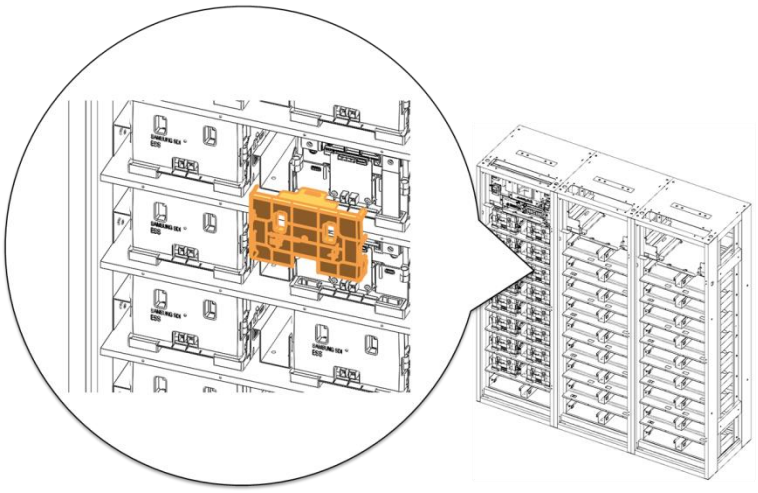


Figure 3-35: Reattach Battery Module #4's Front Cover

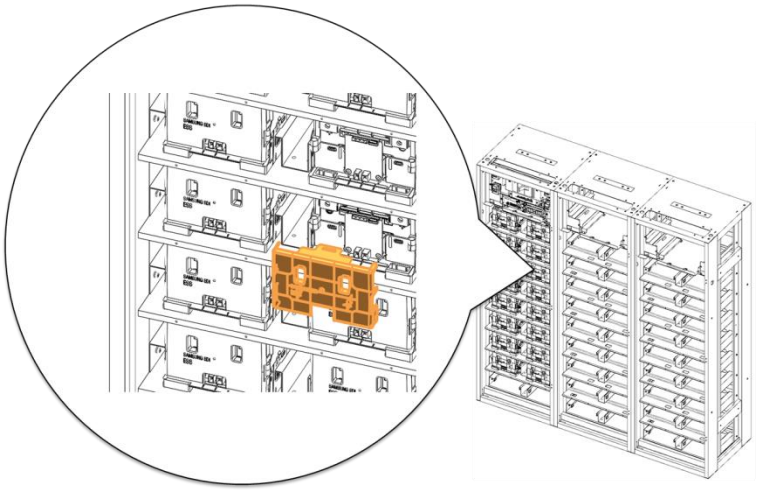


Figure 3-36: Remove Battery Module #6's Front Cover

13. Connect Battery Module #5 B+ and Battery Module #6 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

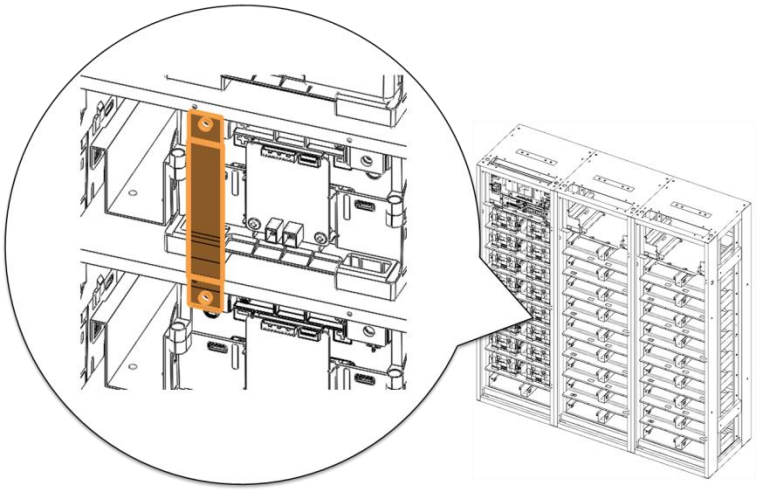


Figure 3-37: Connect Battery Module #5 B+ and Battery Module #6 B-.

14. Reattach Battery Module #5’s front cover and remove Battery Module #7’s front cover.

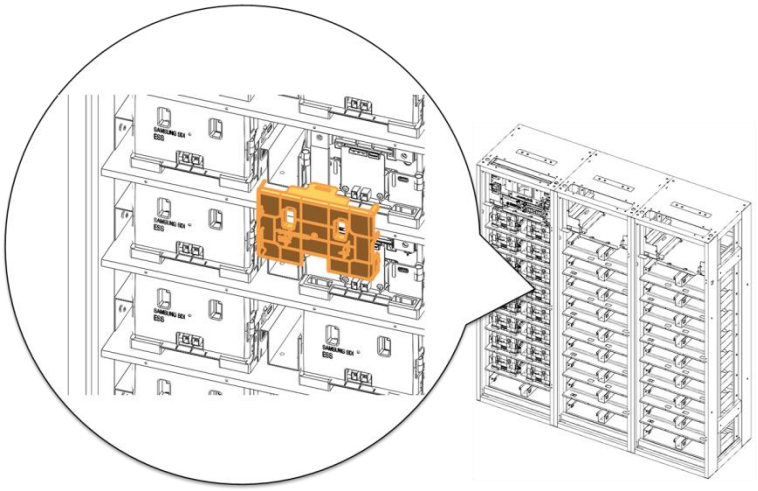


Figure 3-38: Reattach Battery Module #5’s Front Cover

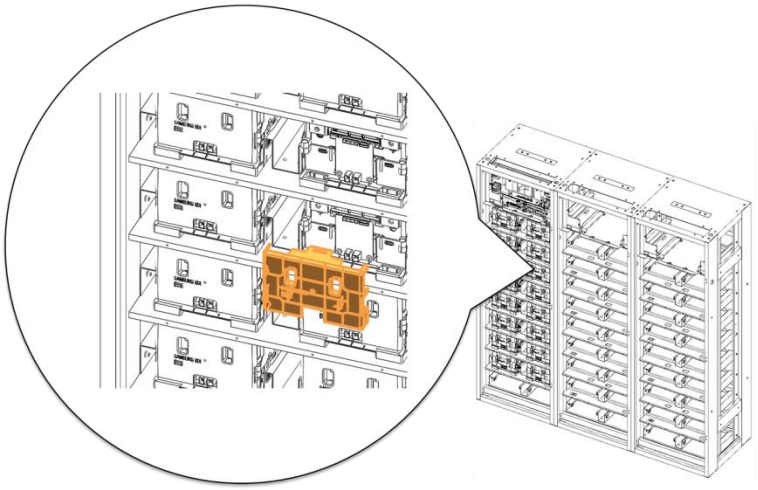


Figure 3-39: Remove Battery Module #7’s Front Cover

15. Connect Battery Module #6 B+ and Battery Module #7 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

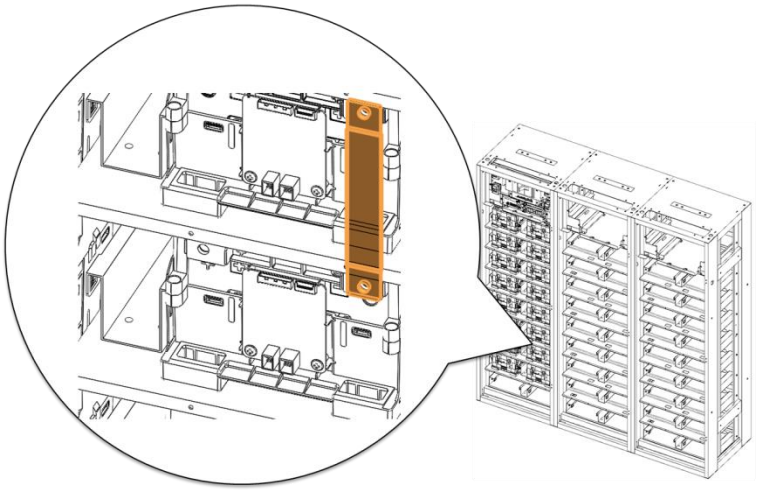


Figure 3-40: Connect Battery Module #6 B+ and Battery Module #7 B-

16. Reattach Battery Module #6's front cover and remove Battery Module #8's front cover.

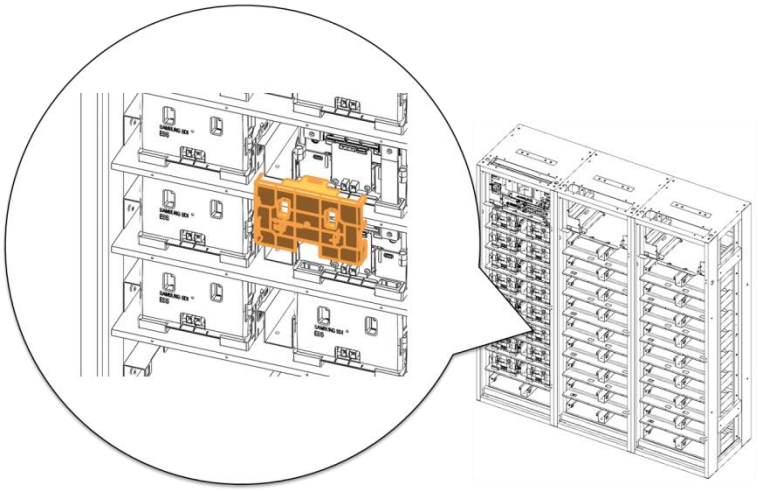


Figure 3-41: Reattach Battery Module #6's Front Cover

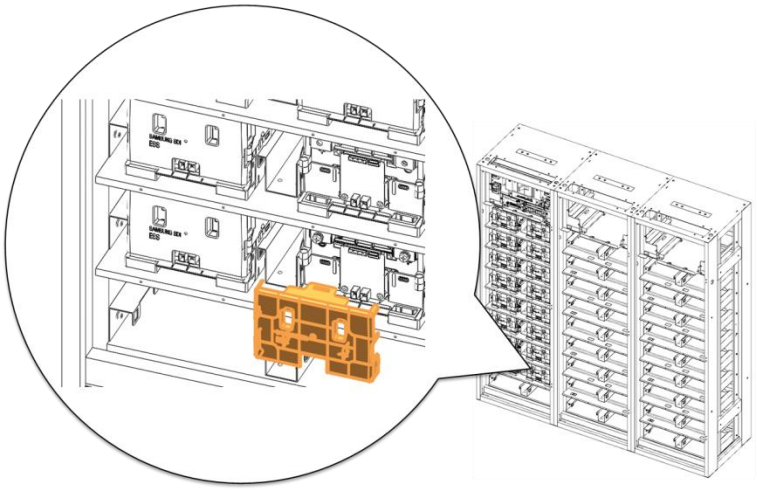


Figure 3-42: Remove Battery Module #8's Front Cover

17. Connect Battery Module #7 B+ and Battery Module #8 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

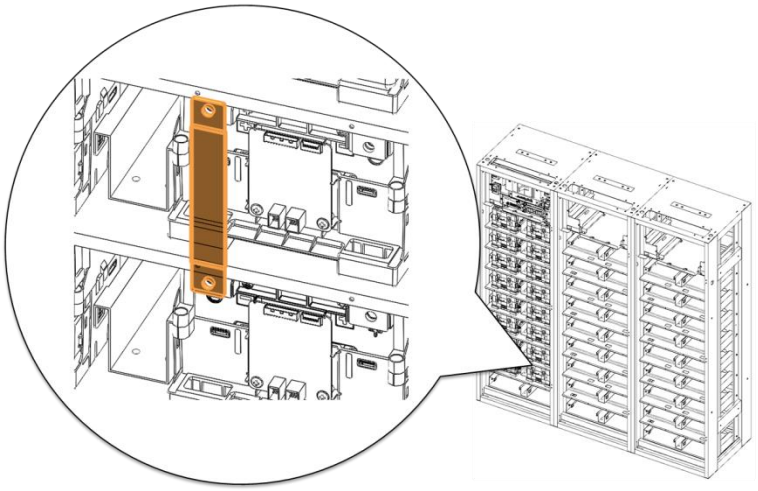


Figure 3-43: Connect Battery Module #7 B+ and Battery Module #8 B-

Connecting Battery Modules #8 and #9 will be done in 3.9.8 Rack Fuse and Additional Module Signal Cable Connection.

18. Reattach the front covers to Battery Modules #7 and #8 and remove the front covers from Battery Modules #9 and #10.

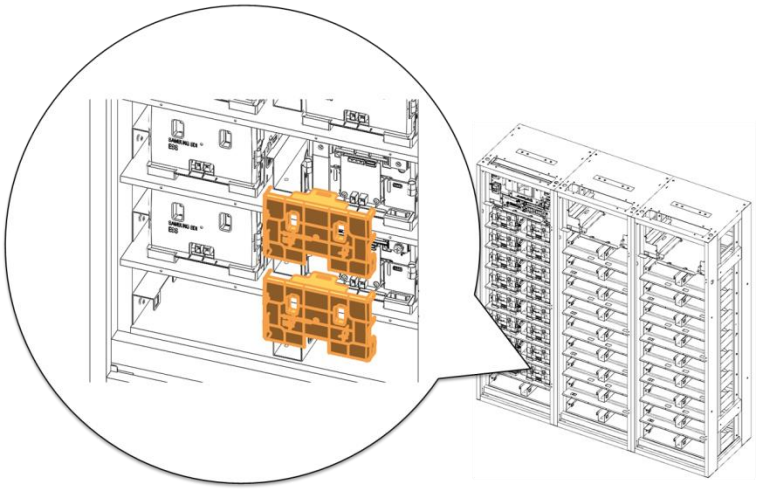


Figure 3-44: Reattach Battery Modules #7 and #8's Front Covers

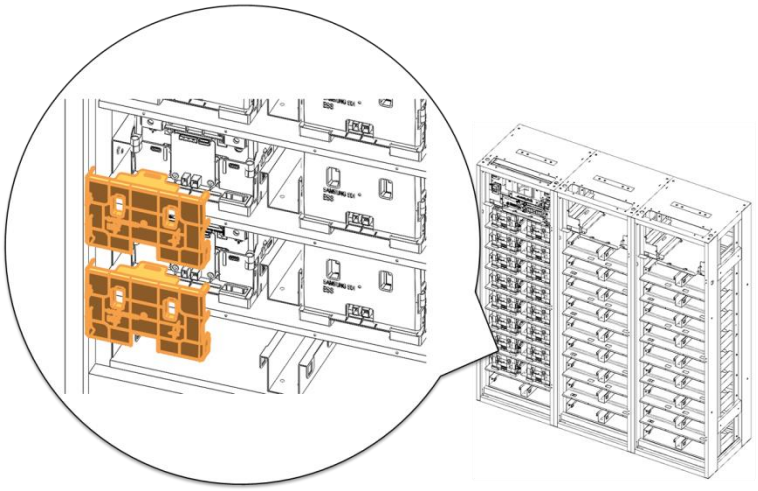


Figure 3-45: Remove Front Covers from Battery Modules #9 and #10

19. Connect Battery Module #9 B+ and Battery Module #10 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

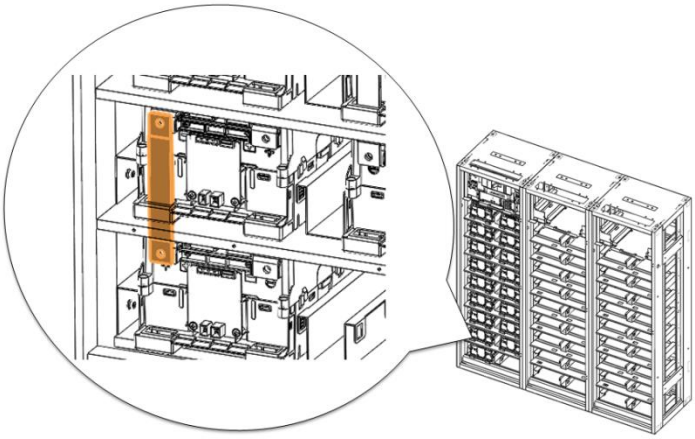


Figure 3-46: Connect Battery Module #9 B+ and Battery Module #10 B-.

20. Reattach Battery Module #9’s front cover and remove Battery Module #11’s front cover.

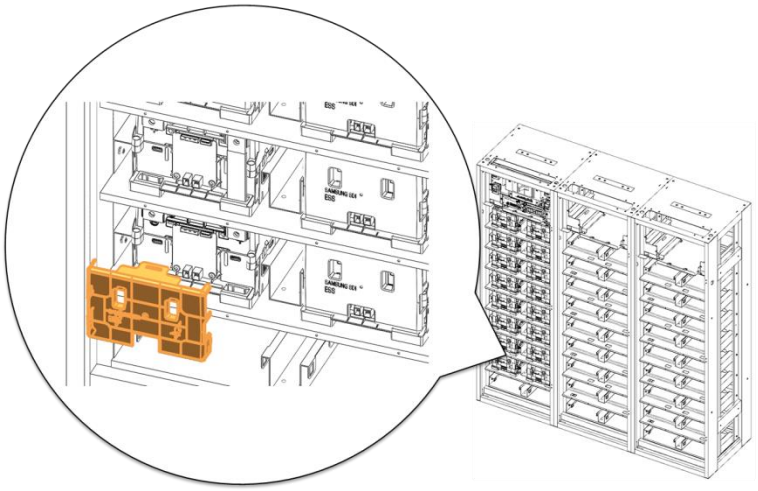


Figure 3-47: Reattach Battery Module #9’s Front Cover

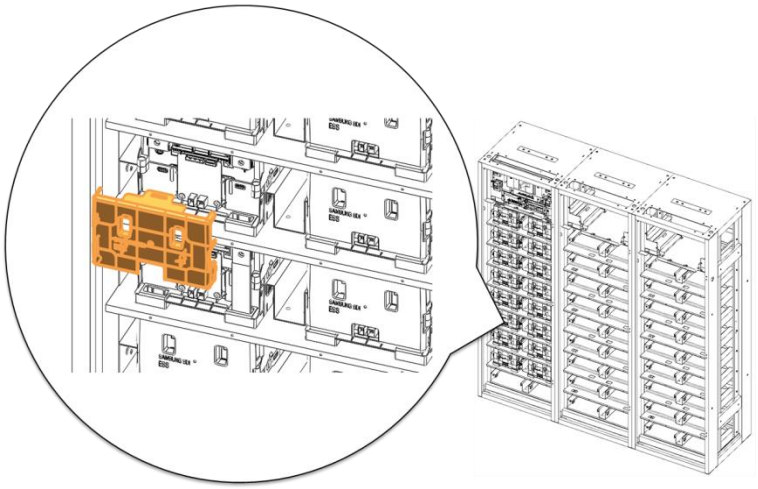


Figure 3-48: Remove Battery Module #11’s Front Cover

21. Connect Battery Module #10 B+ and Battery Module #11 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

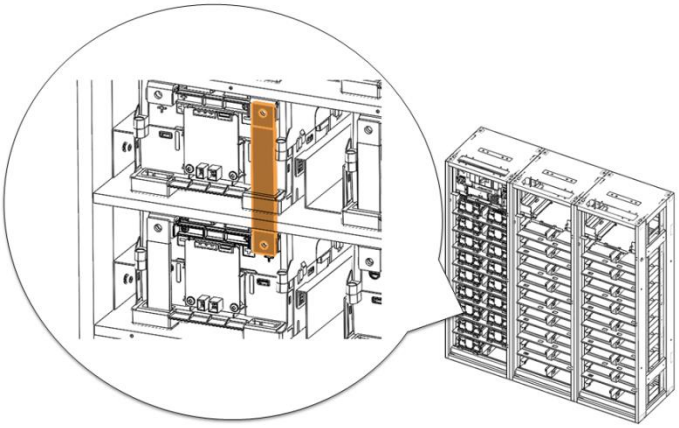


Figure 3-49: Connect Battery Module #10 B+ and Battery Module #11 B-.

22. Reattach Battery Module #10’s front cover and remove Module #12’s front cover.

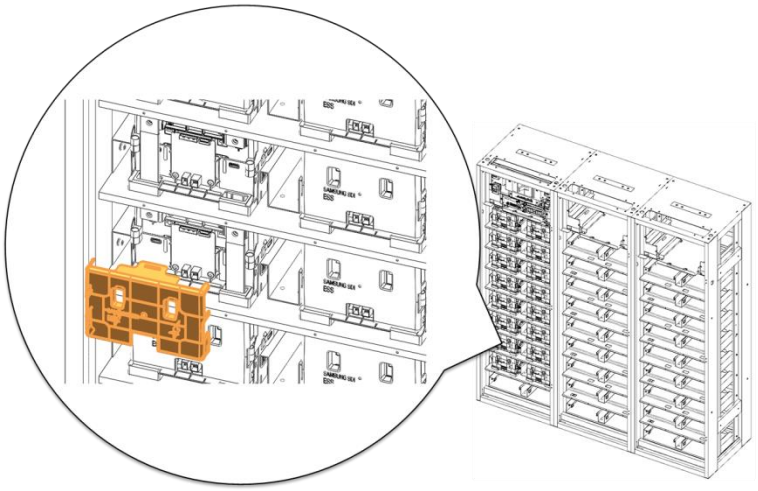


Figure 3-50: Reattach Battery Module #10’s Front Cover

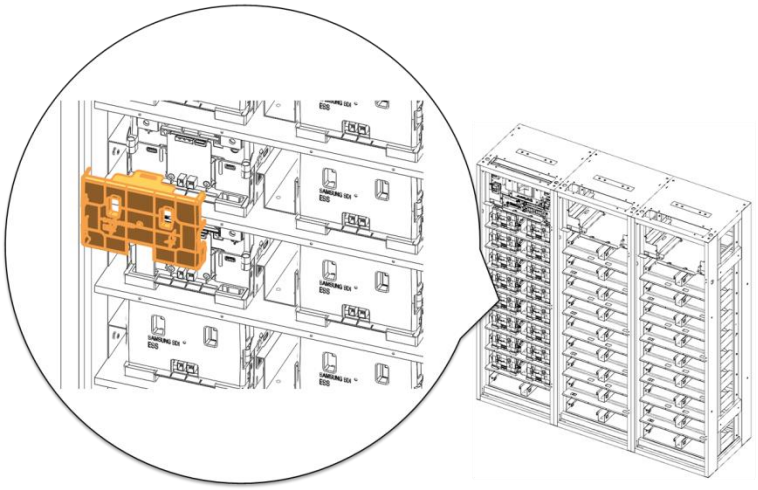


Figure 3-51: Remove Battery Module #12’s Front Cover

23. Connect Battery Module #11 B+ and Battery Module #12 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

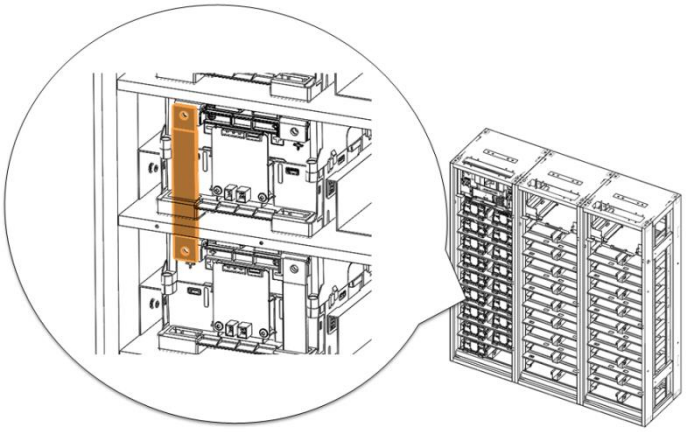


Figure 3-52: Connect Battery Module #11 B+ and Battery Module #12 B-.

24. Reattach Battery Module #11's front cover and remove Battery Module #13's front cover.

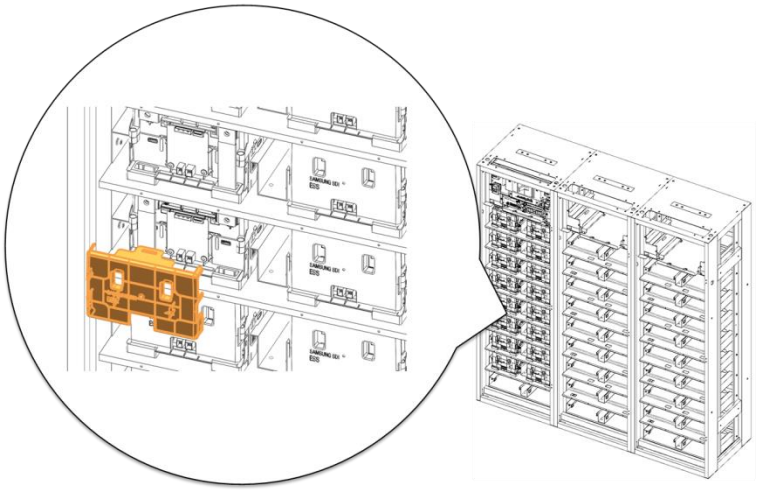


Figure 3-53: Assemble Module #11's Front Cover

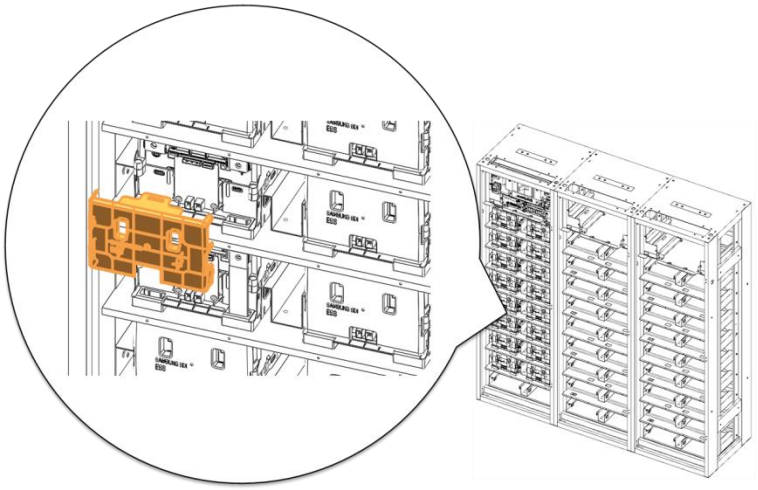


Figure 3-54: Remove Module #13's Front Cover

25. Connect Battery Module #12 B+ and Battery Module #13 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

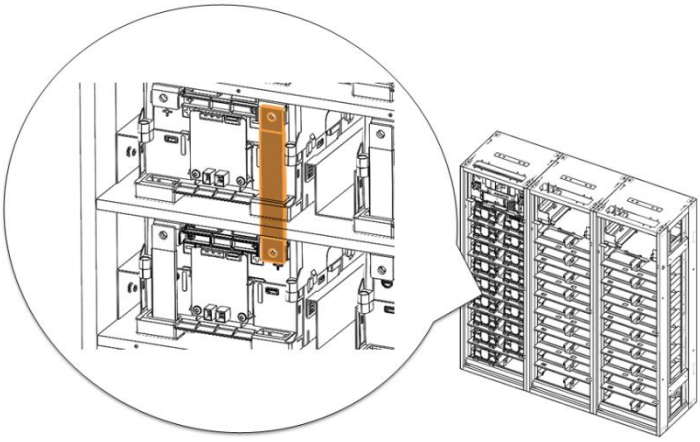


Figure 3-55: Connect Battery Module #12B+ and Battery Module #13 B-.

26. Reattach Battery Module #12's front cover and remove Battery Module #14's front cover.

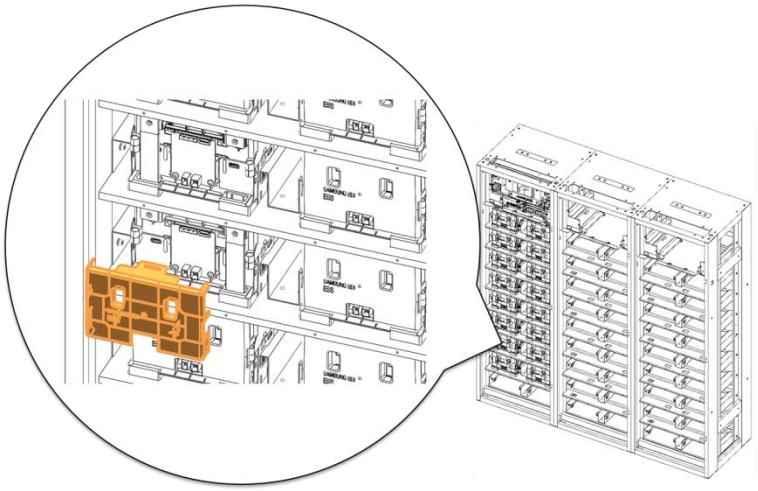


Figure 3-56: Assemble Module #12's Front Cover

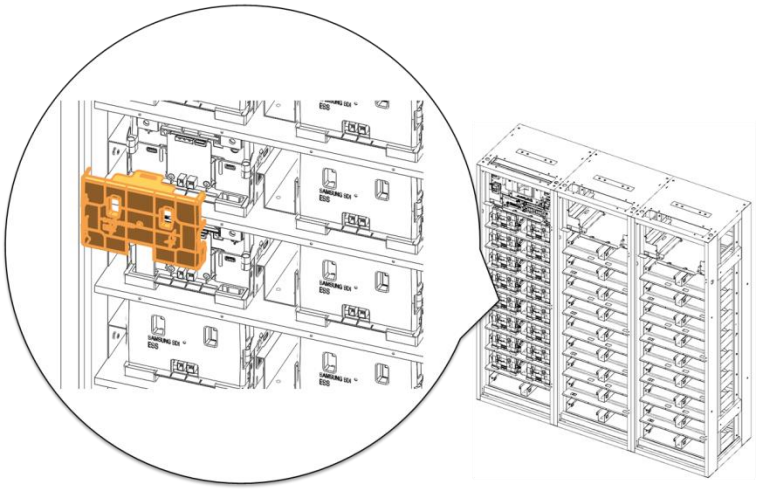


Figure 3-57: Remove Battery Module #14's Front Cover

27. Connect Battery Module #13 B+ and Battery Module #14 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

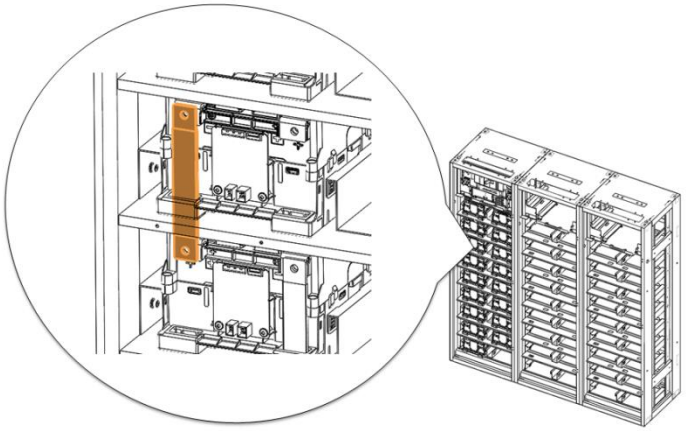


Figure 3-58: Connect Battery Module #13 B+ and Battery Module #14 B-.

28. Reattach Battery Module #13's front cover and remove Battery Module #15's front cover.

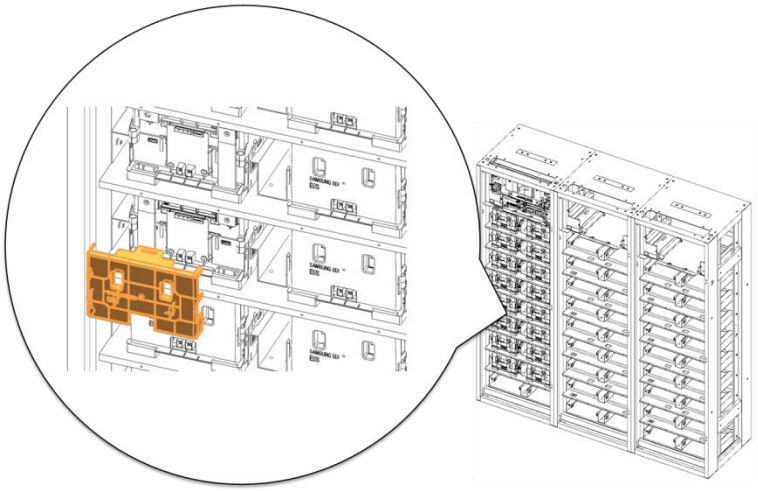


Figure 3-59: Reattach Battery Module #13's Front Cover

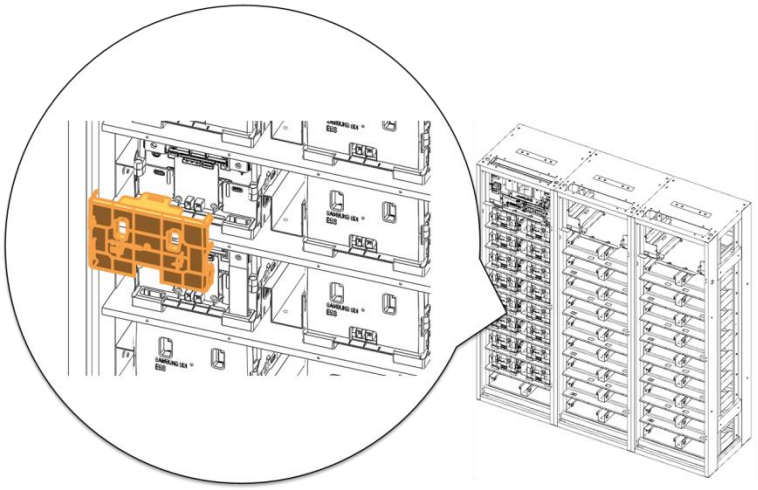


Figure 3-60: Remove Battery Module #15's Front Cover

29. Connect Battery Module #14 B+ and Battery Module #15 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

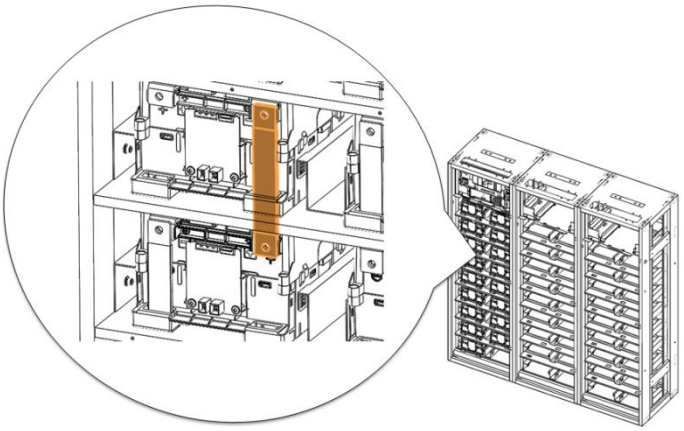


Figure 3-61: Connect Battery Module #14 B+ and Battery Module #15 B-.

30. Reattach Battery Module #14's front cover and remove Battery Module #16's front cover.

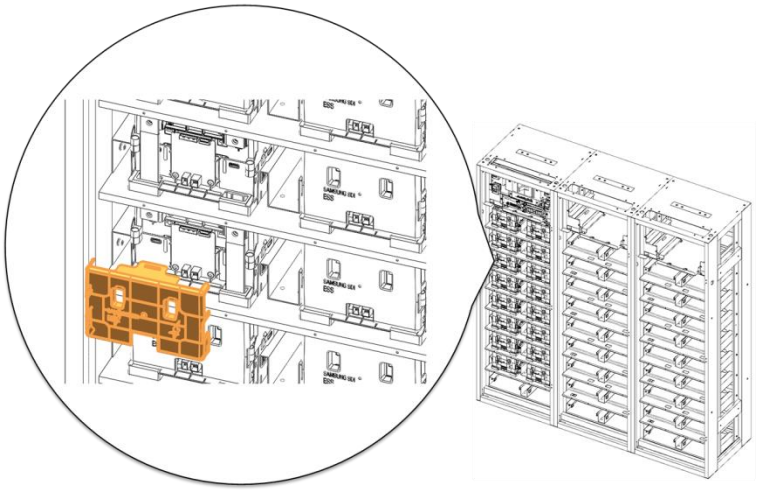


Figure 3-62: Assemble Battery Module #14's Front Cover

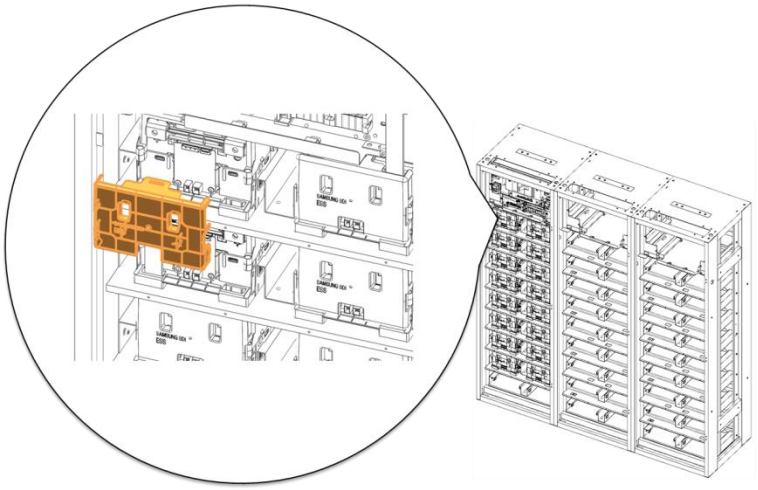


Figure 3-63: Remove Battery Module #16's Front Cover

31. Connect Battery Module #15 B+ and Battery Module #16 B- using “BUS-BAR MAIN.” Connect using an M8 screw.

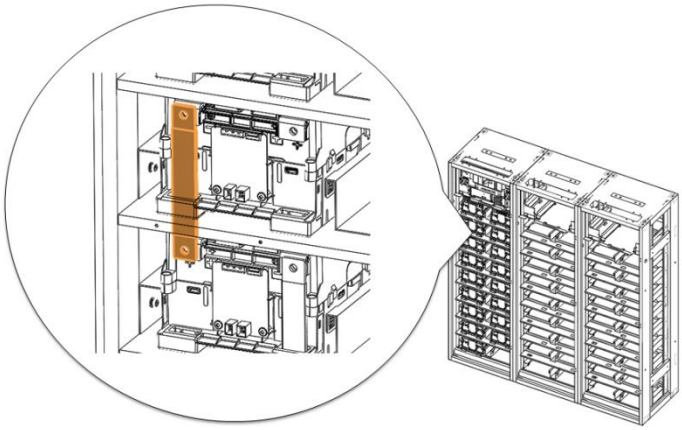


Figure 3-64: Connect Battery Module #15 B+ and Battery Module #16 B-.

32. Reattach Battery Module #15's front cover and remove Battery Module #17's front cover.

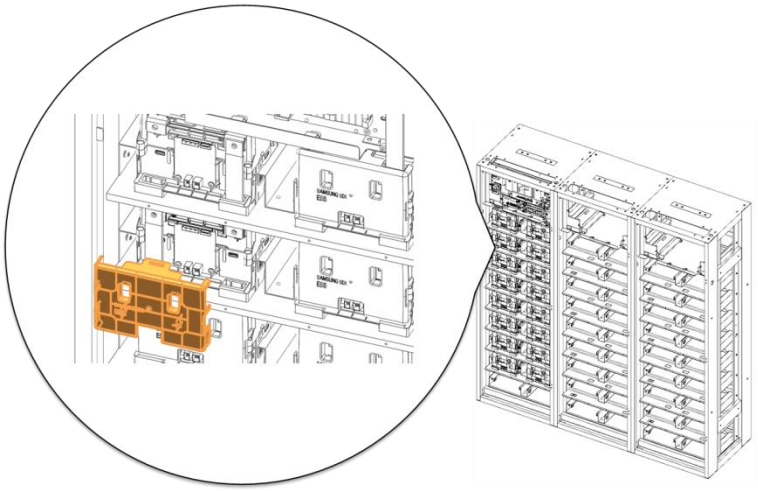


Figure 3-65: Reattach Battery Module #15's Front Cover

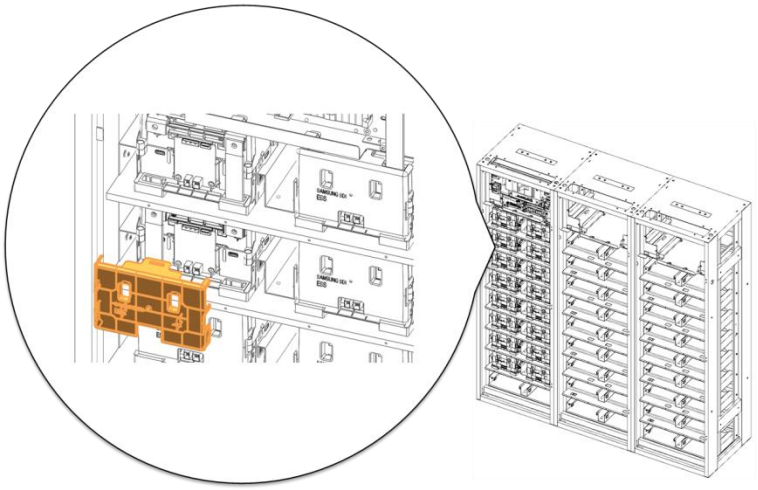


Figure 3-66: Remove Battery Module #17's Front Cover

33. Connect Battery Module #16 B+ and Battery Module #17 B- using “BUS-BAR MAIN”. Connect using M8 screw.

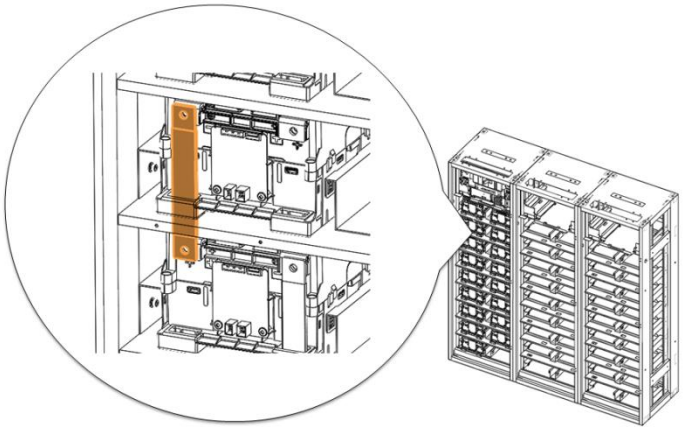


Figure 3-67: Connect Battery Module #15 B+ and Battery Module #16 B-.

34. Reattach Battery Module #16's front cover and remove Switchgear's B+ terminal cover.

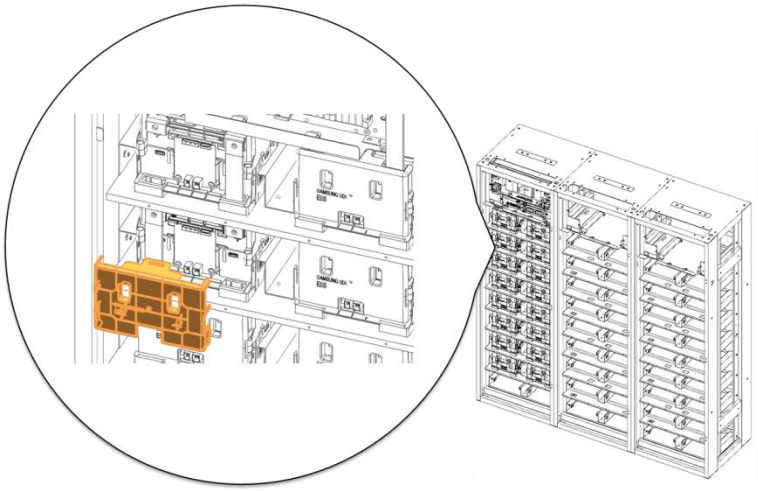


Figure 3-68: Reattach Battery Module #15's Front Cover

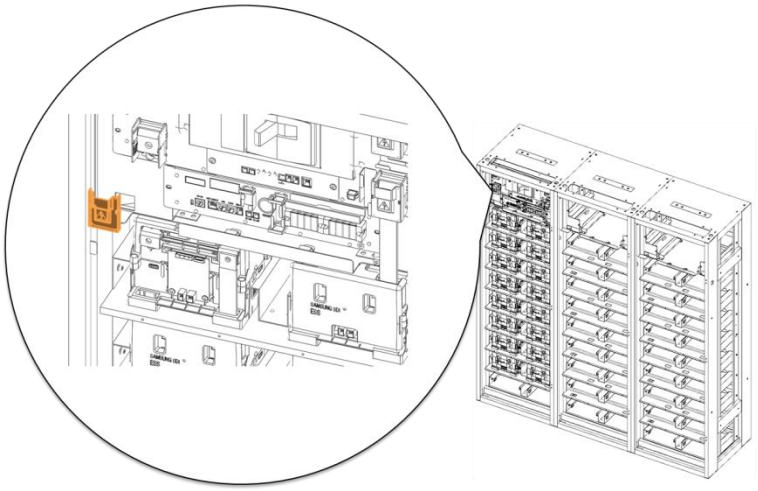


Figure 3-69: Remove Switchgear B+ Terminal Cover

35. Connect Switchgear B+ and Battery Module #17 B+ using “BUSBAR_BUSBAR M TO SG.” Switchgear B+ terminal is connected using an M12 screw and Module #17 B+ terminal is connected using an M8 screw.

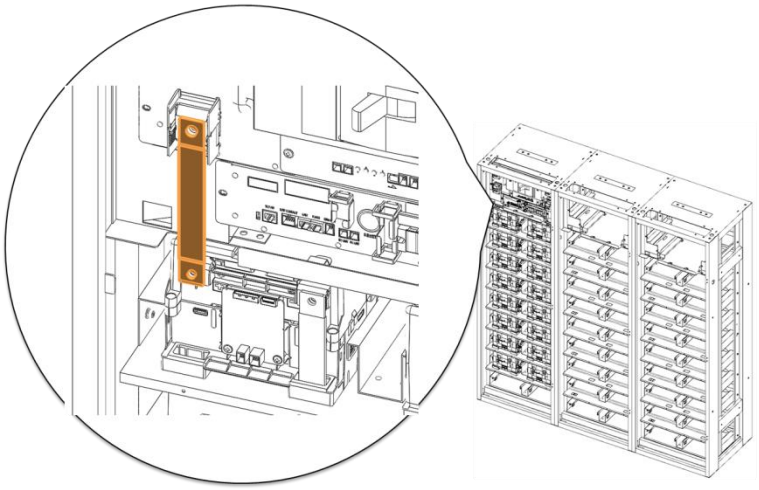


Figure 3-70: Connect Switchgear B+ and Module #17 B+.

36. Reattach Battery Module #17’s front cover and Switchgear B+ terminal cover.

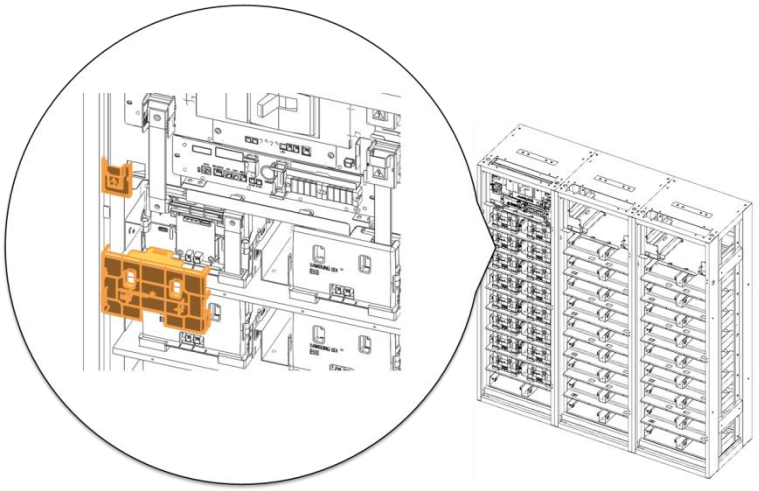


Figure 3-71: Reattach Battery Module #16’s Front Cover and Switchgear B+ Terminal Cover

3.9.4 Module and Switchgear Signal Cable Connection

Connect the signal cables for Switchgear and Module BMS's for each module.

	NOTICE
	▪ Use the proper signal cables as specified by the part numbers below.

	WARNING
	Rack BMS / Module BMS Damage Do not insert both ends of the signal cable WIRE ASSY MODULE TO MODULE #1 or WIRE ASSY MODULE TO MODULE #2 into the same Battery Module.

1. Connect the signal cable "WIRE ASSY RACK TO MODULE SHIELDING" between the switchgear "MODULE" connector and Module #1 "OUT" connector. Pass the cable through the opening above Module #1.

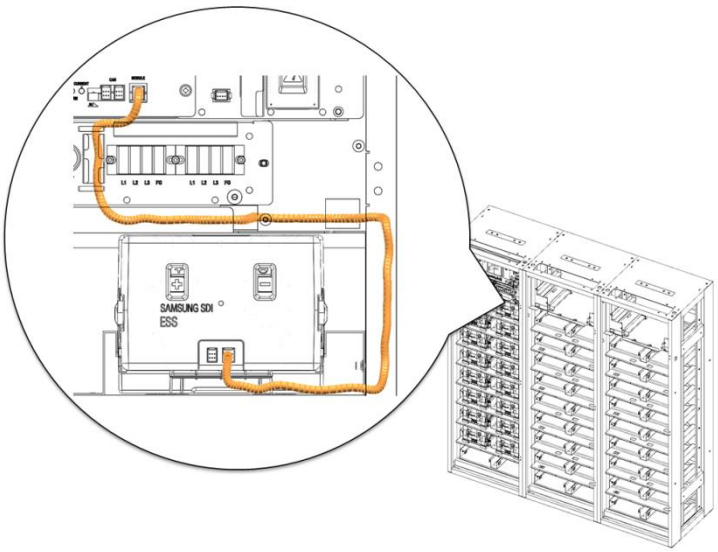


Figure 3-72: Rack BMS to Module #1 OUT Signal Cable

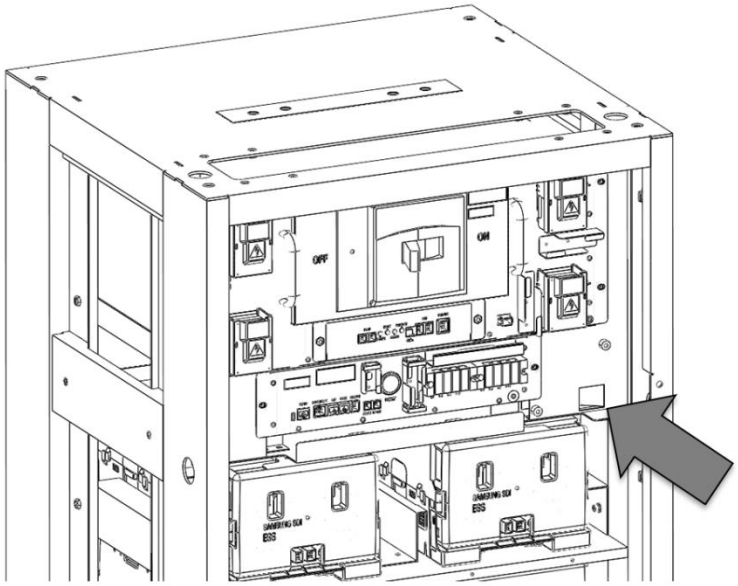


Figure 3-73: Opening for Cable Installation

2. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #1 “IN” to Module #2 “OUT.”

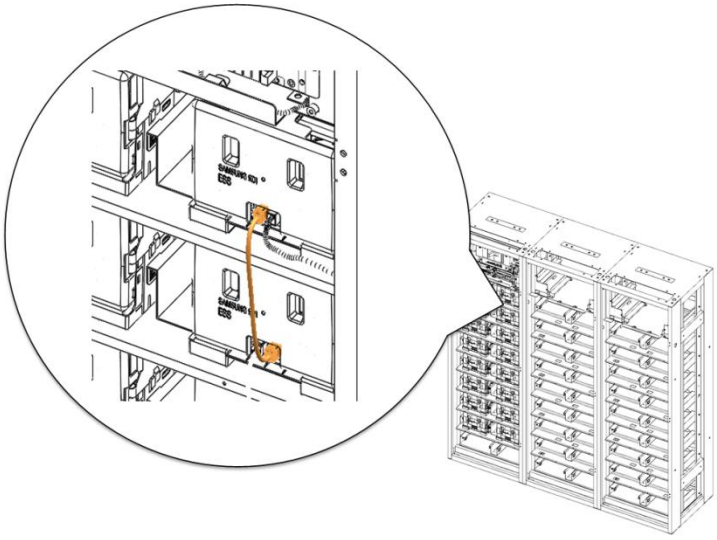


Figure 3-74: Module #1 to Module #2 Signal Cabling

3. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #2 “IN” to Module #3 “OUT.”

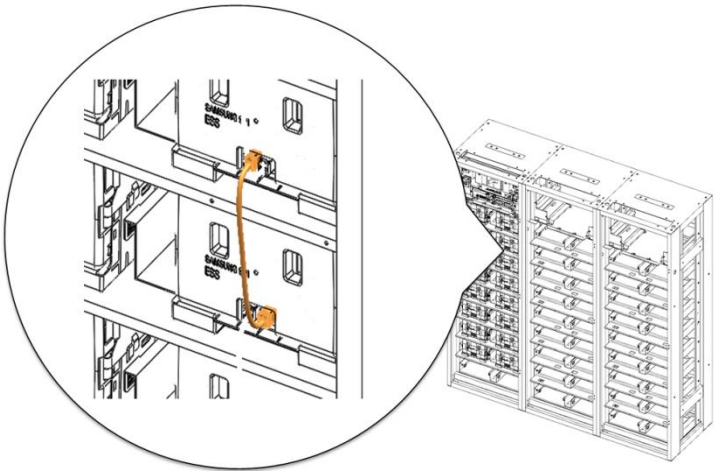


Figure 3-75: Module #2 to Module #3 Signal Cabling

4. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #3 “IN” to Module #4 “OUT.”

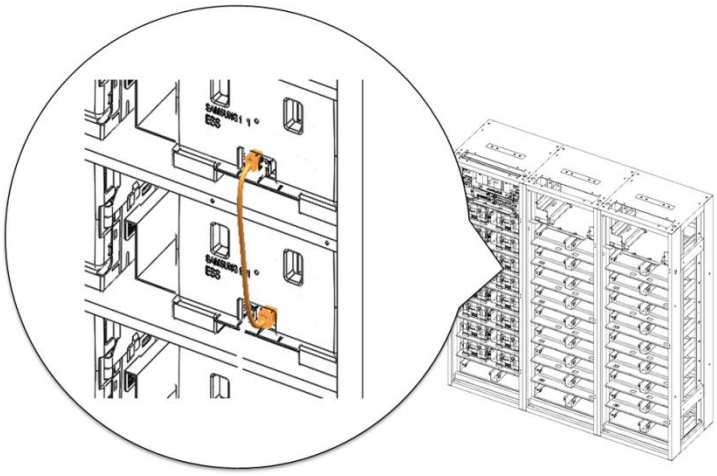


Figure 3-76: Module #3 to Module #4 Signal Cabling

5. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #4 “IN” to Module #5 “OUT.”

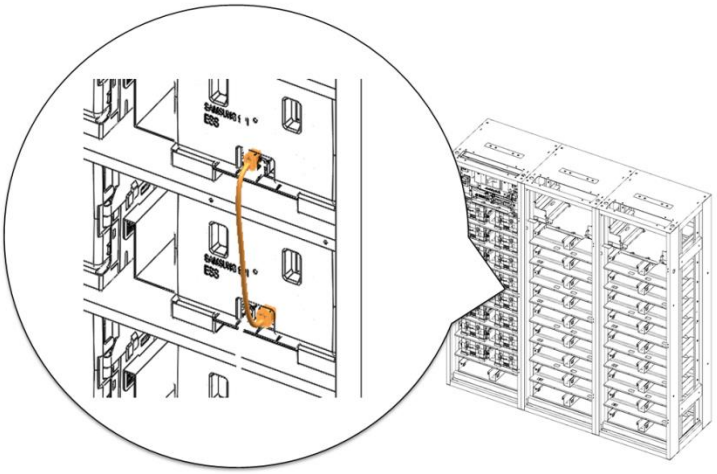


Figure 3-77: Module #4 to Module #5 Signal Cabling

6. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #5 “IN” to Module #6“OUT”.

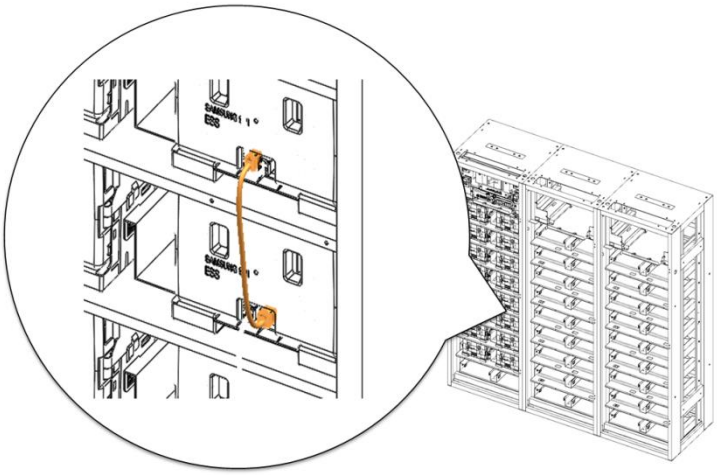


Figure 3-78: Module #5 to Module #6 Signal Cabling

7. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #6 “IN” to Module #7 “OUT.”

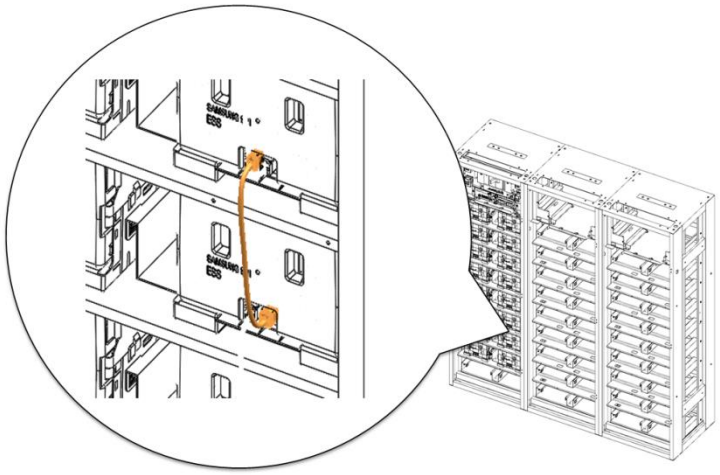


Figure 3-79: Module #6 to Module #7 Signal Cabling

Signal cables connecting Module #7 to #8, #8 to #9 and #9 to #10 will be installed in 3.9.8 Rack Fuse and Additional Module Signal Cable Connection.

8. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #10 “IN” to Module #11 “OUT.”

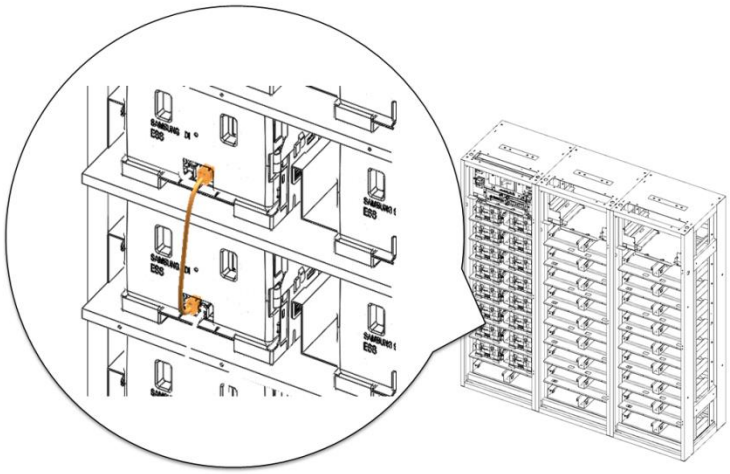


Figure 3-80: Module #10 to Module #11 Signal Cabling

9. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #11 “IN” to Module #12 “OUT.”

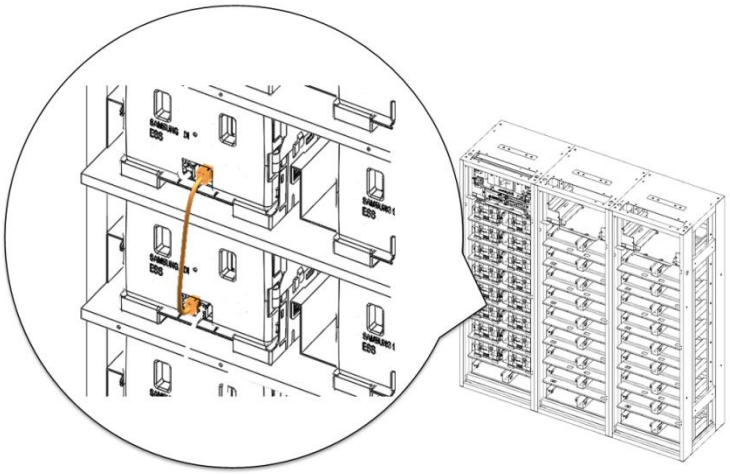


Figure 3-81: Module #11 to Module #12 Signal Cabling

10. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #12 “IN” to Module #13 “OUT.”

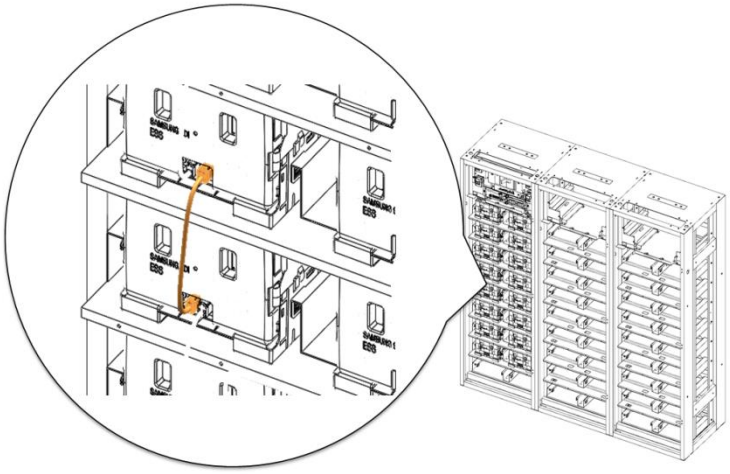


Figure 3-82: Module #12 to Module #13 Signal Cabling

11. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #13 “IN” to Module #14 “OUT.”

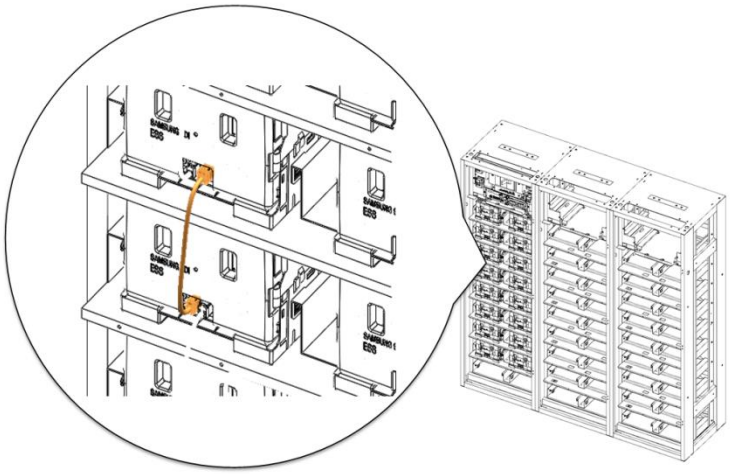


Figure 3-83: Module #13 to Module #14 Signal Cabling

12. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #14 “IN” to Module #15 “OUT.”

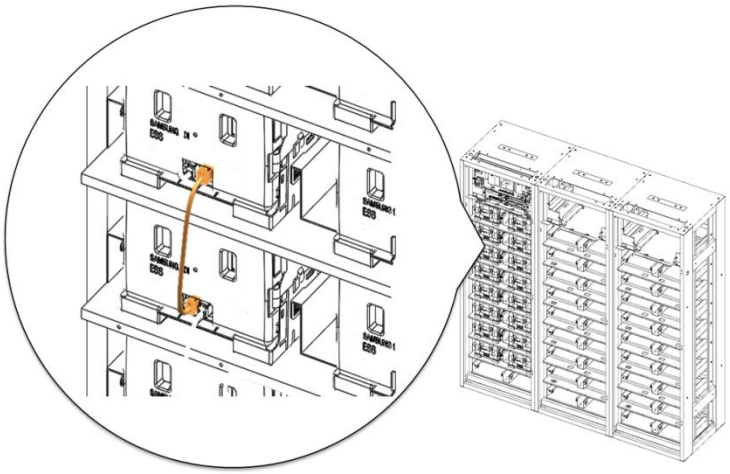


Figure 3-84: Module #14 to Module #15 Signal Cabling

13. Connect the signal cable “WIRE ASSY MODULE TO MODULE **#**1" from Module #15 “IN” to Module #16 “OUT.”

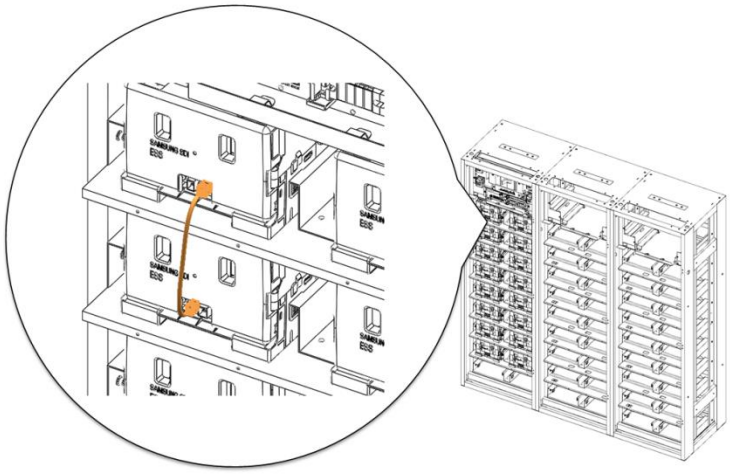


Figure 3-85: Module #15 to Module #16 Signal Cabling

14. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Module #16 “IN” to Module #17 “OUT”.

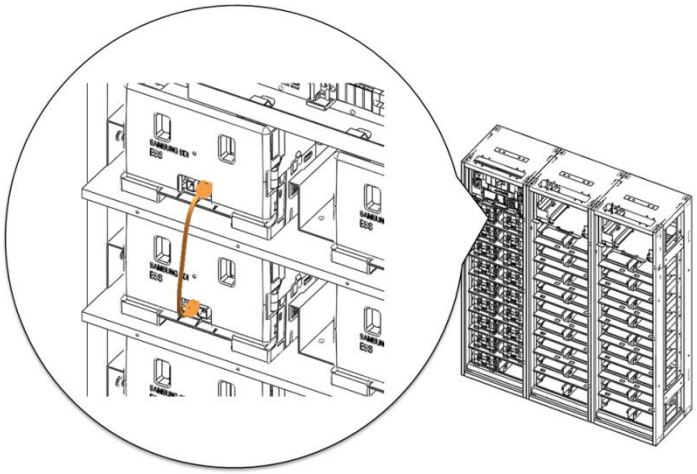


Figure 3-86: Module #16 to Module #17 Signal Cabling

15. For a multiple rack system, connect the signal cables “WIRE ASSY RACK TO RACK #2” between each rack’s Switchgear. Push the pre-punched hole to pass the cable through a circular hole in the side of the rack frame and through the opening above Module #1 and Module #16.

⚠	***NOTICE***
	▪ See the examples for correct signal cable wire connections for both left and right rack alignments.

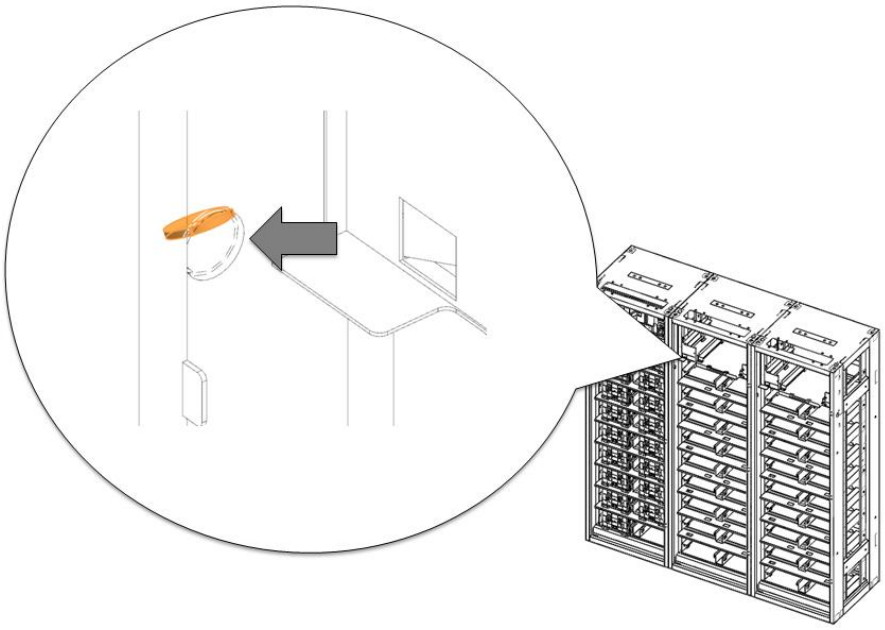


Figure 3-87: Pre-Punched Hole for Signal Cable

Signal Cabling Examples of Left Alignment of Trays

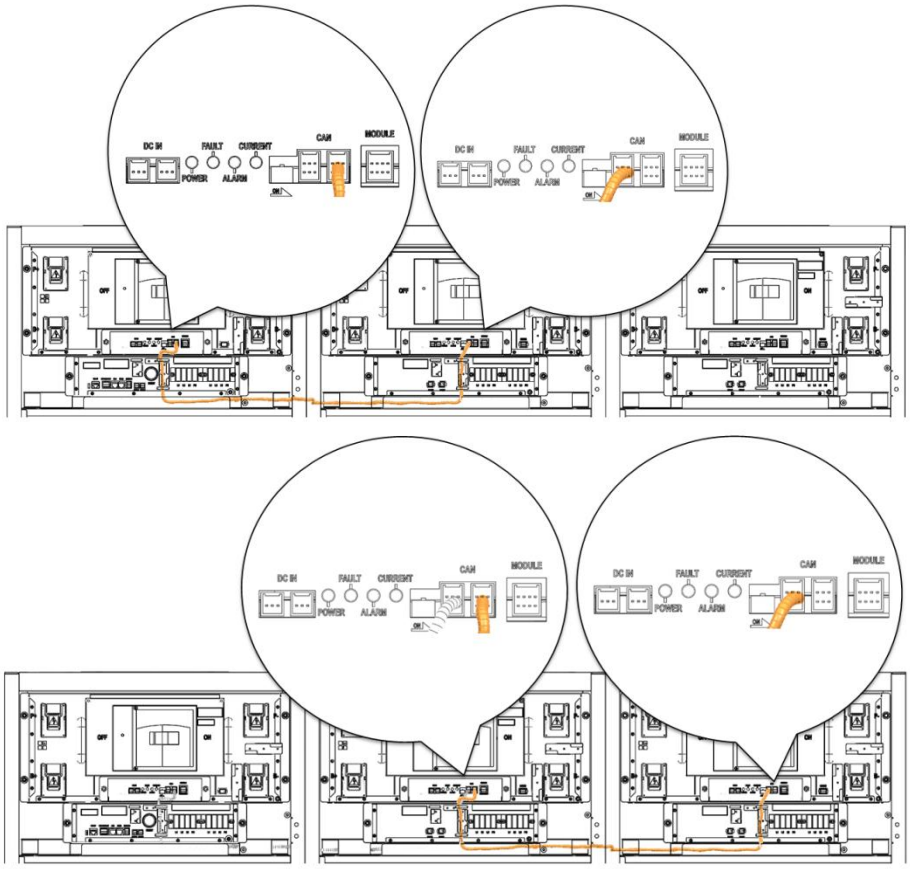


Figure 3-88: Signal Cabling Examples of Left Alignment of Switchgear

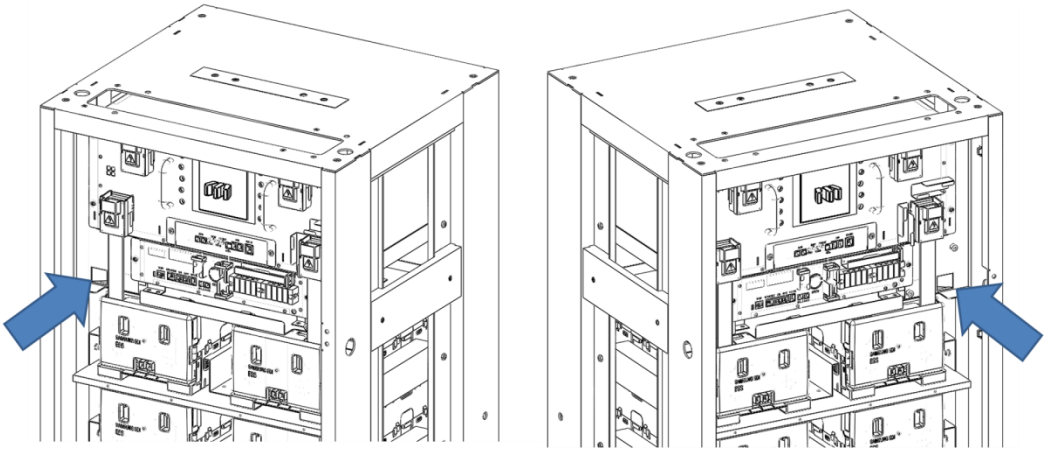


Figure 3-89: Openings for Cable

16. Turn the termination resistor switch on for the last Switchgear in the CANbus loop.

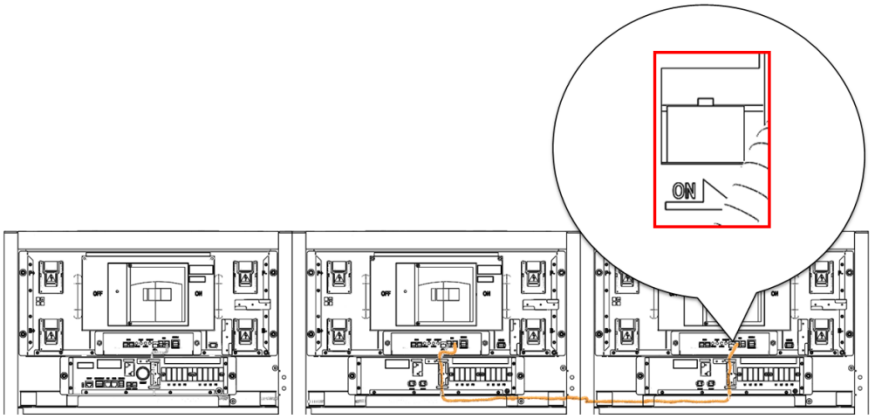


Figure 3-90: Termination Resistor Setting for Last Switchgear

	NOTICE
	▪ Factory-provided cables are adequate for systems with Rack Frames bolted together. Different configurations may require cable modification.

3.9.5 SMPS Assembly and Switchgear Power Cable Connection

Connect the Switchgear DC power cables.

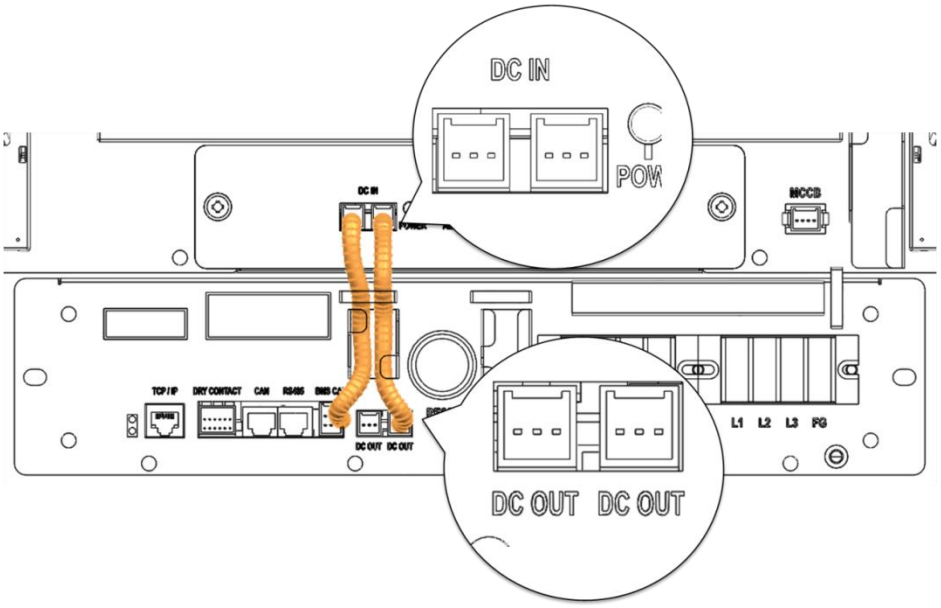


Figure 3-91: DC Power Cables from SMPS Assembly Type A to Switchgear

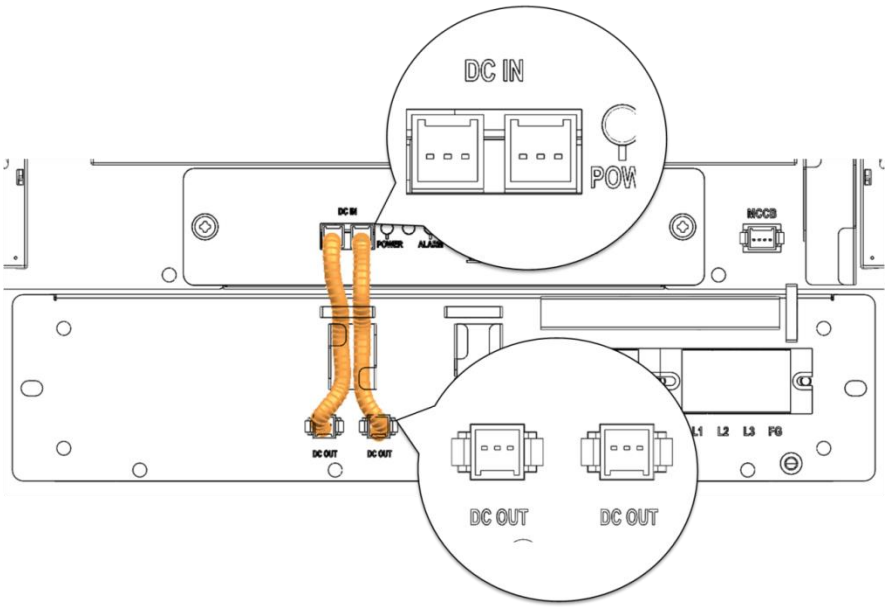


Figure 3-92: DC Power Cables from SMPS Assembly Type B to Switchgear

3.9.6 SMPS Assembly and Switchgear Signal Cable Connection

The following steps are only for an SMPS Assembly Type A.

1. Connect the signal cable from the SMPS Assembly to Switchgear “WIRE ASSY RACK TO SYSTEM.”

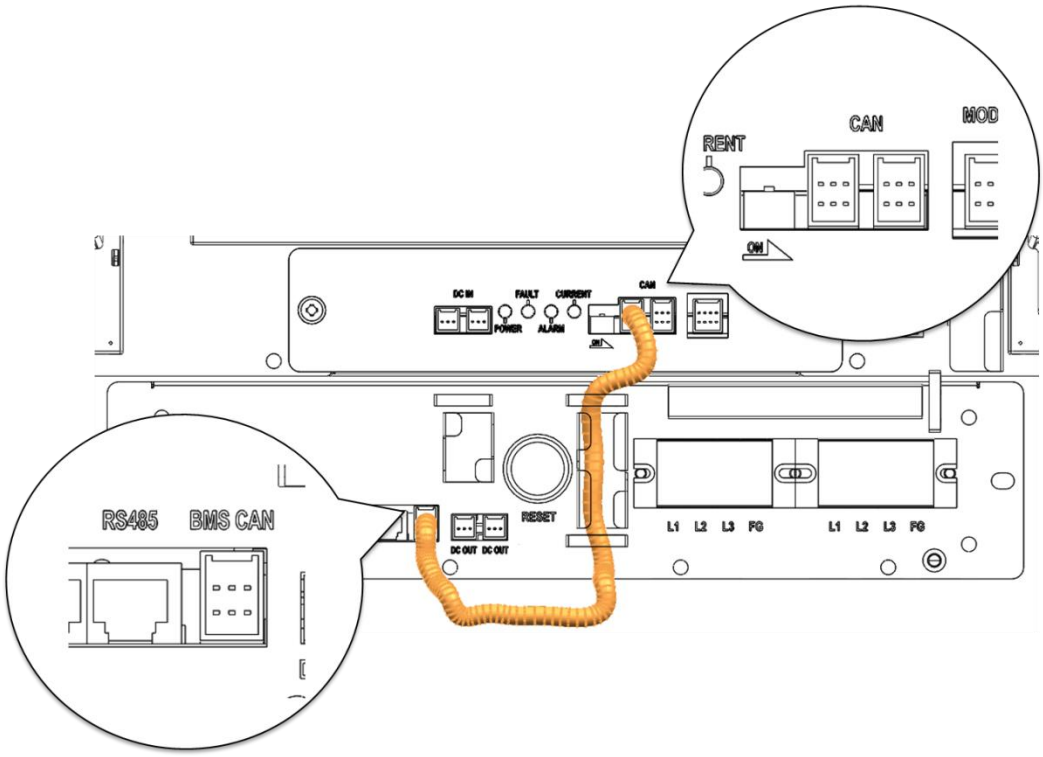


Figure 3-93: CAN Signal Cable Connection from SMPS Assembly to Switchgear

1. Connect the SMPS Assembly TCP/IP Cable[4] to the SMPS Assembly.

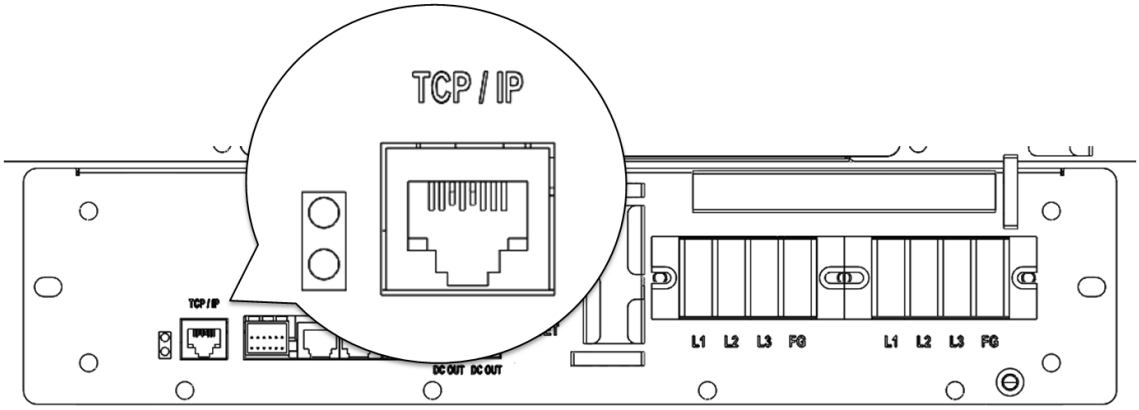


Figure 3-94: TCP/IP Cable Connection to SMPS Assembly

[4] Not factory-provided. Must be provided by the installer or customer.

2. Connect the SMPS Assembly Dry Contact Cable[5].

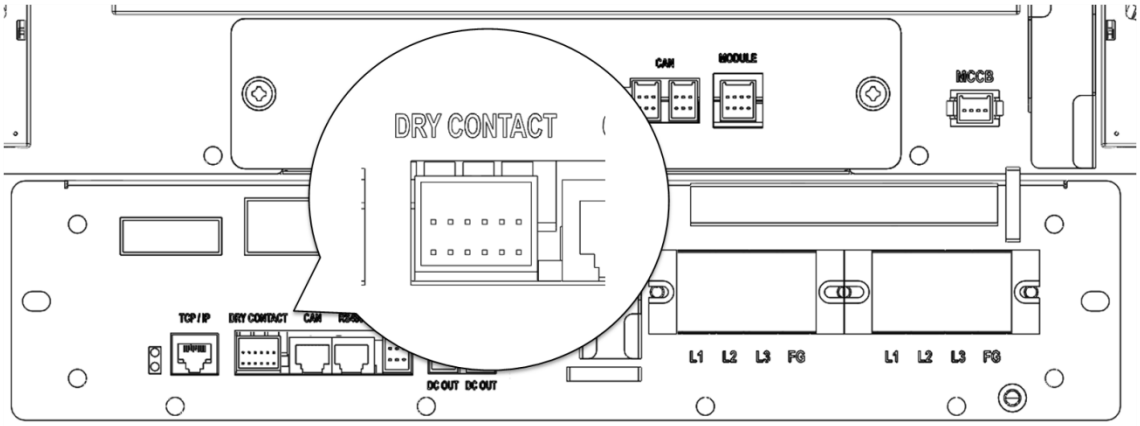


Figure 3-95: Dry Contact Cable Connection to SMPS Assembly

3. Connect the Switchgear MCCB Cable[6].

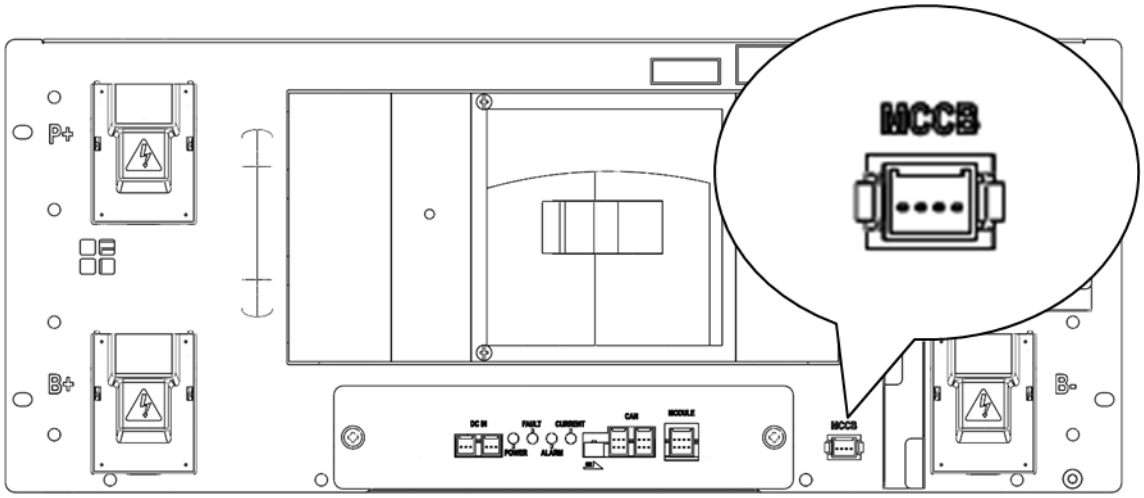


Figure 3-96: MCCB Extra Auxiliary Connection

[5] Not factory-provided. Must be provided by the installer or customer
[6] Not factory-provided. Must be provided by the installer or customer

3.9.7 SMPS Assembly AC Input Connection

1. Remove the protective covers from the AC input terminals.

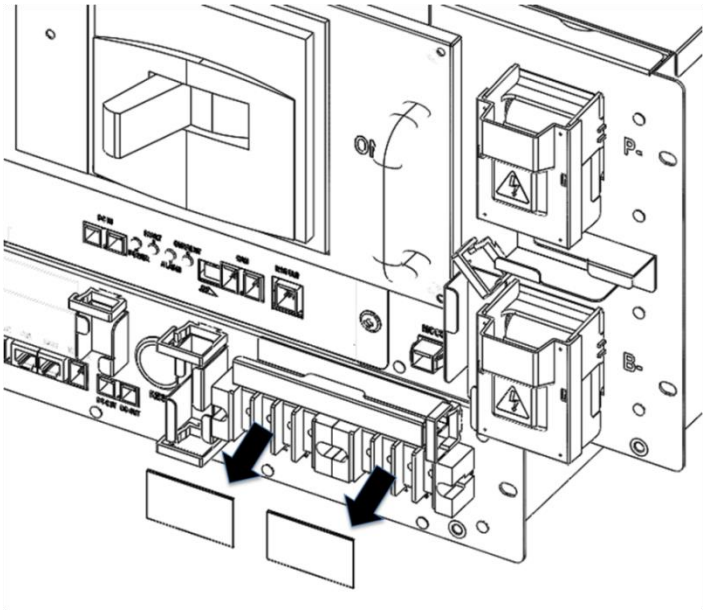


Figure 3-97: AC Input Terminals

2. Connect each AC input in the SMPS Assembly. Make sure the AC cables are not energized.[7]

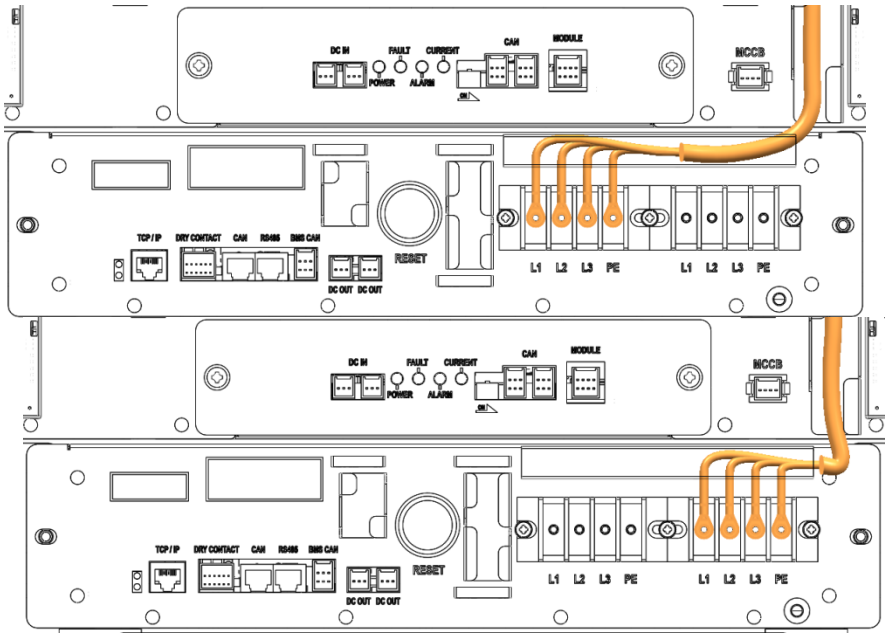


Figure 3-98: AC Input Terminals with Cables Attached

[7] AC Cables are not factory-provided. They must be provided by the installer or customer.

3. Reattach the protective covers to the AC input.

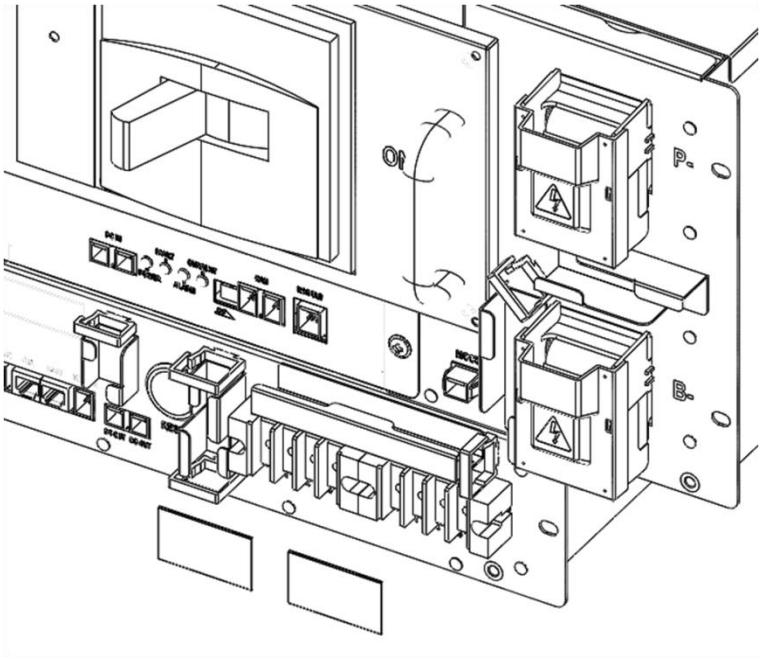


Figure 3-99: AC Input Terminals Protective Covers

3.9.8 Rack Fuse and Additional Module Signal Cable Connection

⚠	***NOTICE*** The rack fuse cover must be installed over the fuse to prevent the exposure of live electrical parts.

1. Remove the front covers from Battery Modules #8 and #9.

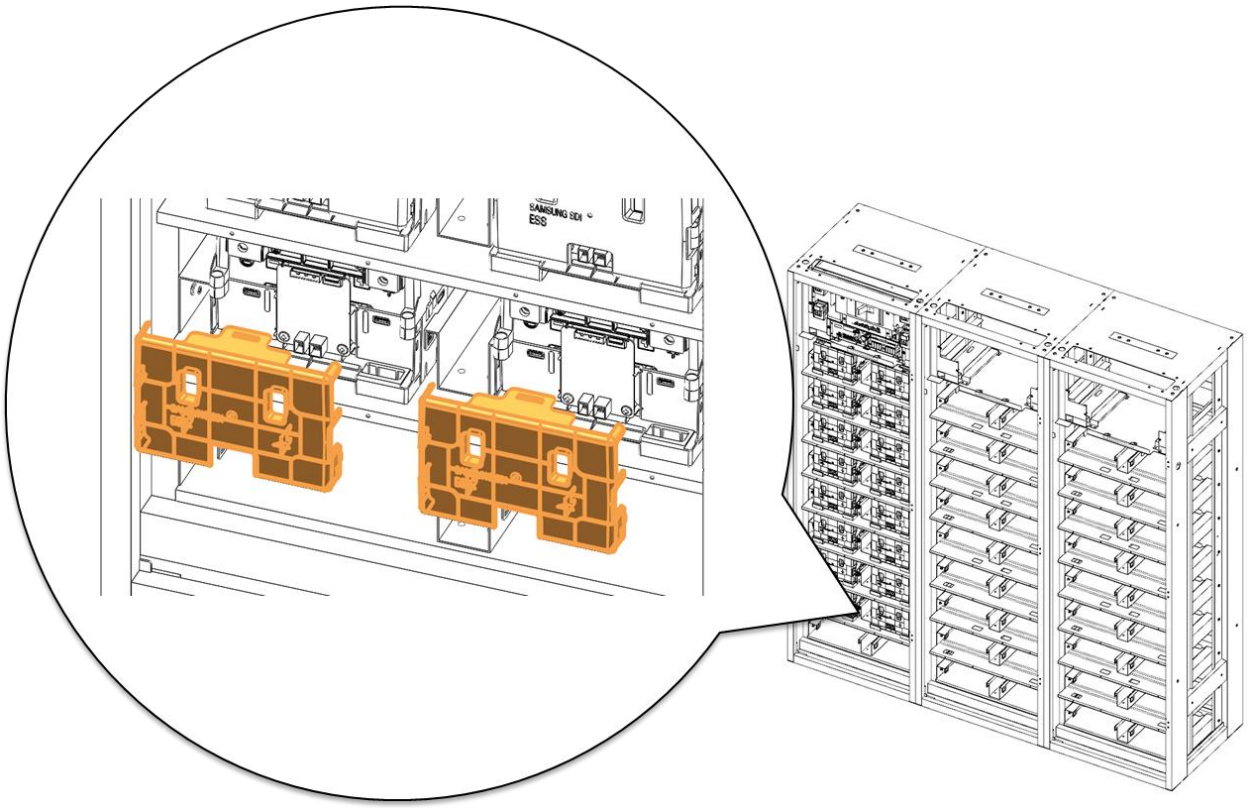


Figure 3-100: Remove Front Covers from Battery Modules #8 and #9

2. Assemble the Rack fuse Bus-bar assembly. Rack fuse bus-bar assembly is comprised of one “RACKFUSE BUSBAR_R_136S”, one “RACKFUSE BUSBAR_L_136S”, two “SCREW M12 X 16” and one “FUSE”

⚠	***NOTICE***
	Rack Fuse Busbar Assembly is assembled at the installation location. M12 X 16L screws are used to assemble the busbars and fuse. The fastening torque should be 30 Nm (300 kgf/cm).

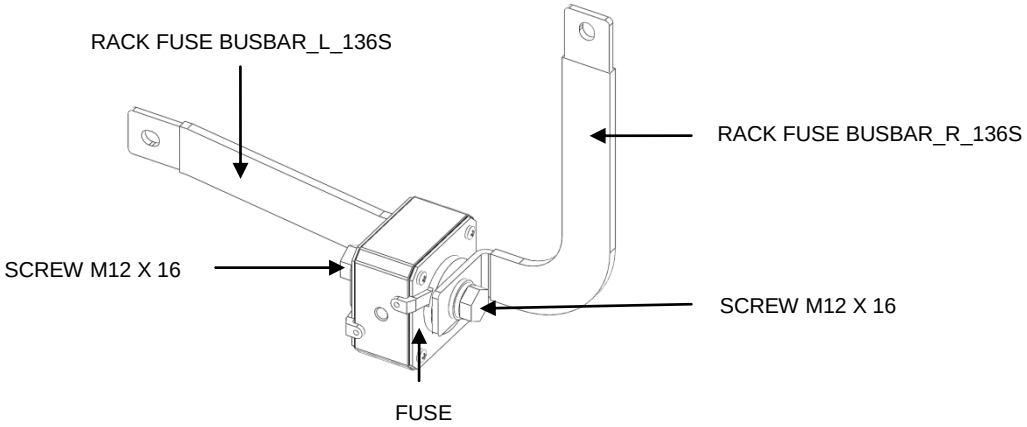


Figure 3-101: Rack Fuse Busbar Assembly.

3. Assemble Rack Fuse Cover “FUSE COVER.”

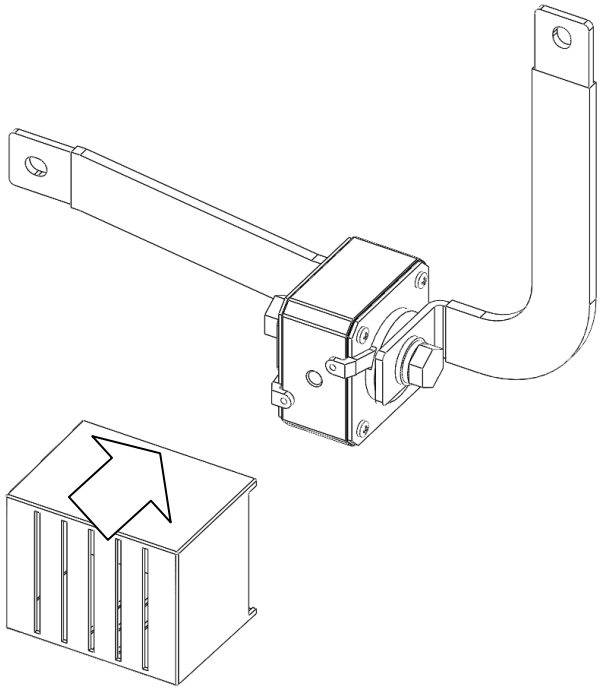


Figure 3-102: Rack Fuse Cover

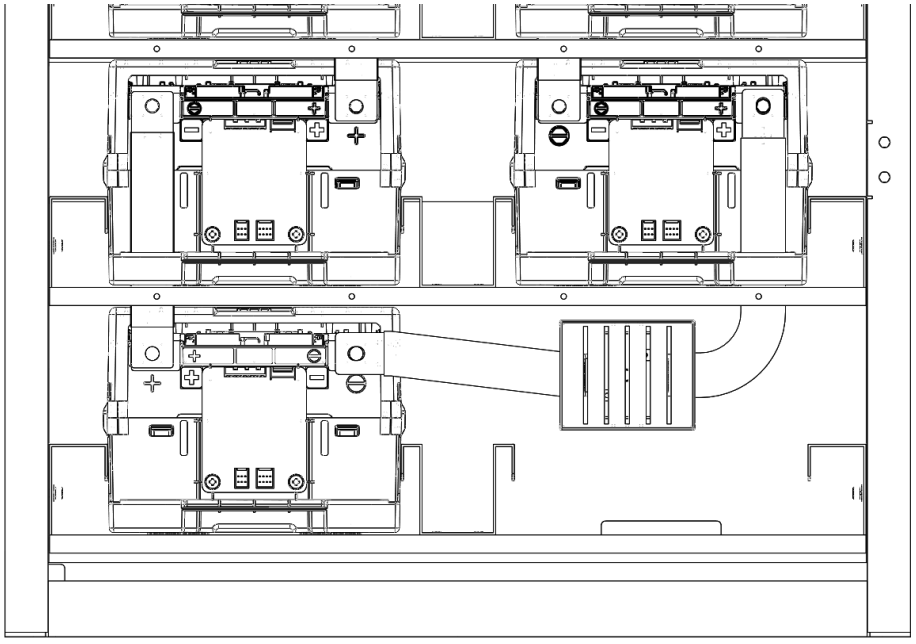


Figure 3-103: Rack Fuse Cover (Fully Assembled; Front View)

4. Reattach the front covers to Battery Modules #8 and #9.

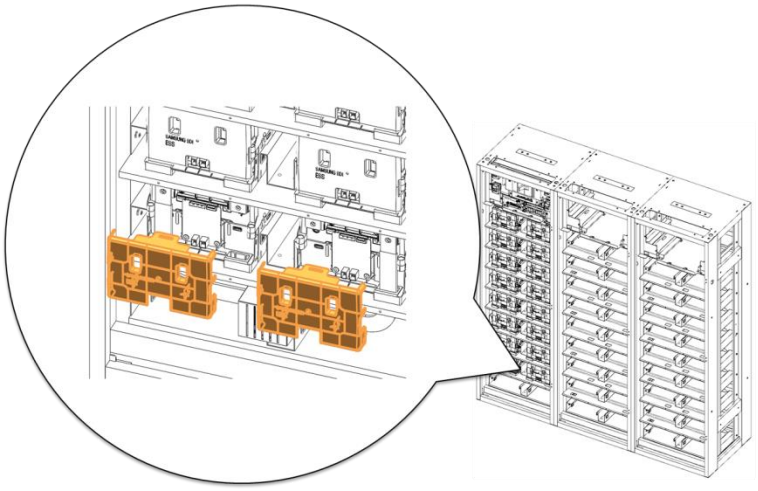


Figure 3-104: Reattach Front Covers to Battery Modules #8 and #9

5. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Battery Module #7 “IN” to Battery Module #8 “OUT.”

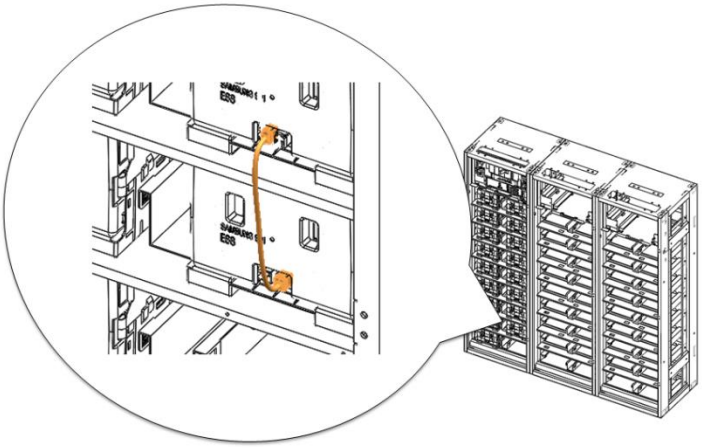


Figure 3-105: Battery Module #7 to Battery Module #8 Signal Cabling

6. Connect the signal cable “WIRE ASSY MODULE TO MODULE #2" from Battery Module #8 “IN” to Battery Module #9 “OUT.”

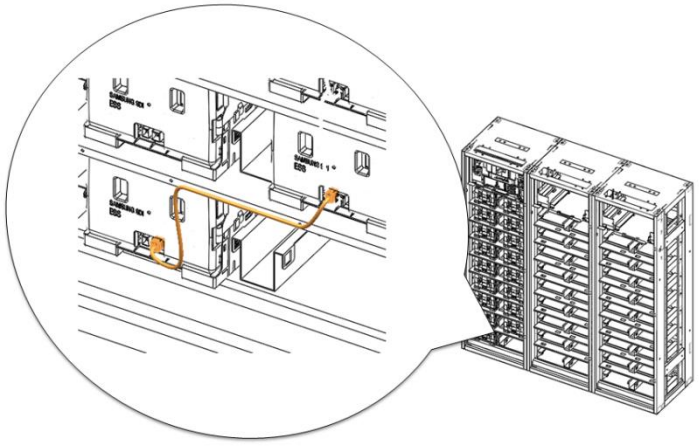


Figure 3-106: Battery Module #8 to Battery Module #9 Signal Cabling (WIRE ASSY MODULE TO MODULE #2)

7. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1" from Battery Module #9 “IN” to Battery Module #10 “OUT.”

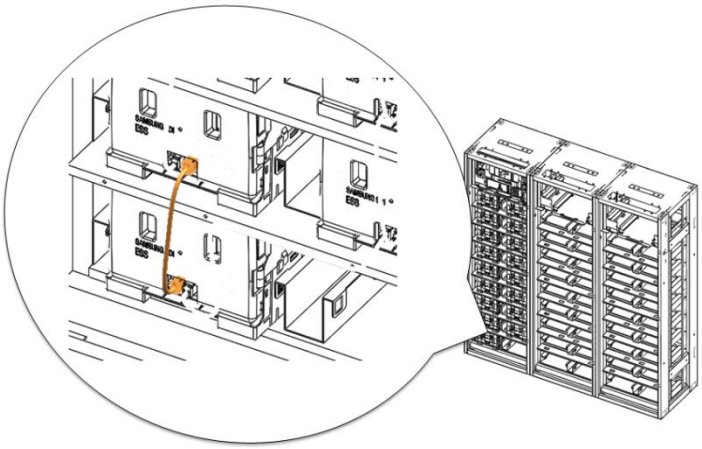


Figure 3-107: Battery Module #9 to Battery Module #10 Signal Cabling

3.9.9 DC Link Cable Connection

1. Connect the ground cables.

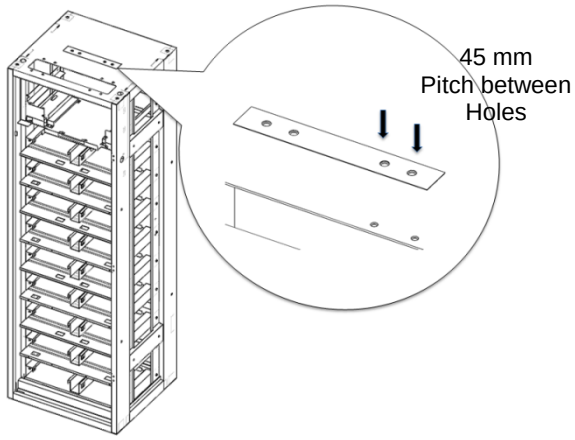


Figure 3-108: Grounding Points (2 EA)

Ground connections are provided on the bottom and on the top of the rack. Either may be used for grounding.

	NOTICE
	▪ Connect the rack ground wire with an M12 screw. Rack ground screws are not factory-provided and must be provided by the installer or customer. ▪ The fastening torque should be 30Nm (300kgf·cm).

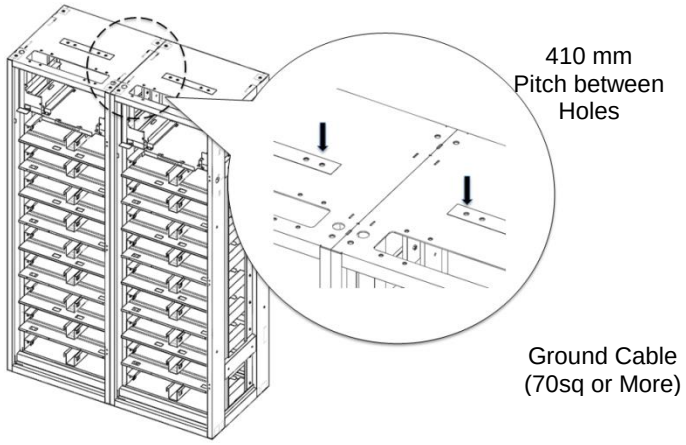


Figure 3-109: Connection of Ground Cable for Multiple Rack Frames

2. Connect the DC link high-voltage cables from the UPS.

	**CAUTION** ▪ Verify with a voltmeter that no power is present on the system. Disconnect all input power supplies. Use lock out/tag out procedures to secure the UPS and battery system before beginning this step. ▪ In this step, the battery and UPS are isolated by the Switchgear because the circuit breaker in the switchgear is opened.

	***NOTICE*** ▪ Connect the high-voltage cables using an M12 bolt. ▪ The fastening torque should be 30 Nm (300 kgf/cm).

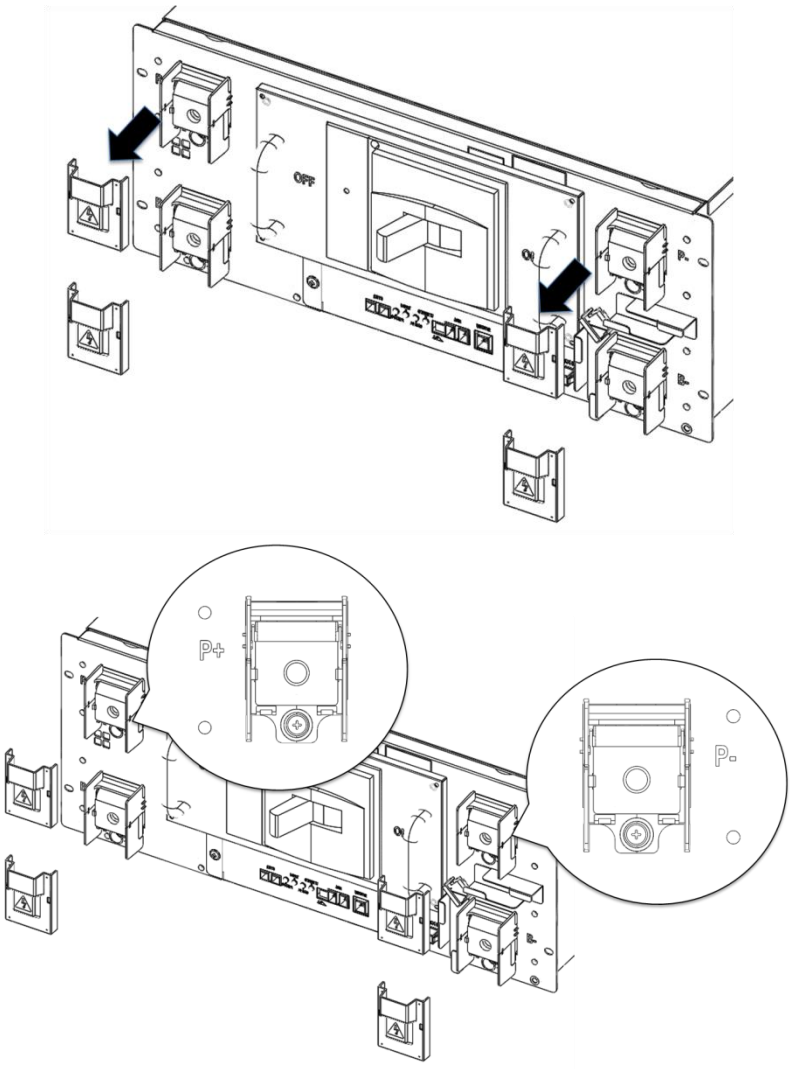


Figure 3-110: Connecting the DC Link High Current Cables

After installation is complete, check the following:

- Bolt fastening condition

- Screw fastening torque by sampling
- High-voltage cable connection
- Module connections
- Switchgear connections

3.9.10 AC Input Commissioning

When the installation of the battery system is complete, SMPS Assembly's AC inputs must be powered to turn the BMS on.

3.9.11 Switching on the MCCB

After powering on the battery system's SMPS Assembly and Switchgear, check the indicator LED to determine whether the system status is normal. Refer to the "Product Specification" and "Operation and Maintenance Manual" for information on the indicator LED.

	CAUTION
	▪ Follow the instruction and guidelines for the UPS on connecting the battery to the UPS before switching on the MCCB.

The MCCB in the Switchgear should be in the "TRIP" position during installation.

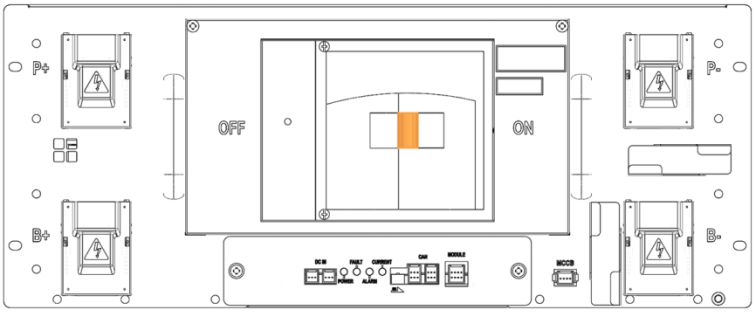


Figure 3-111: MCCB Handle in Trip Position

Shift the handle of the MCCB to "OFF."

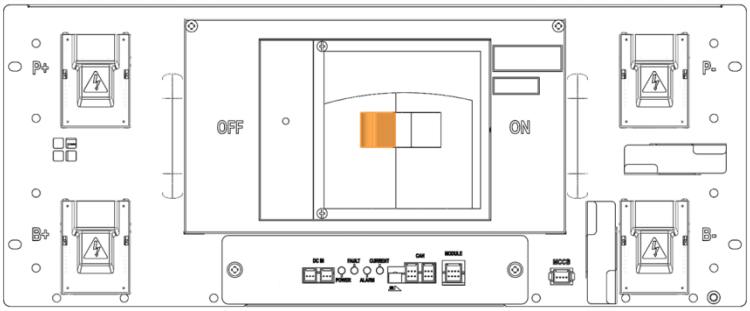


Figure 3-112: MCCB Handle in Off Position

Then shift the handle to "ON" to connect the battery system to the UPS DC link.

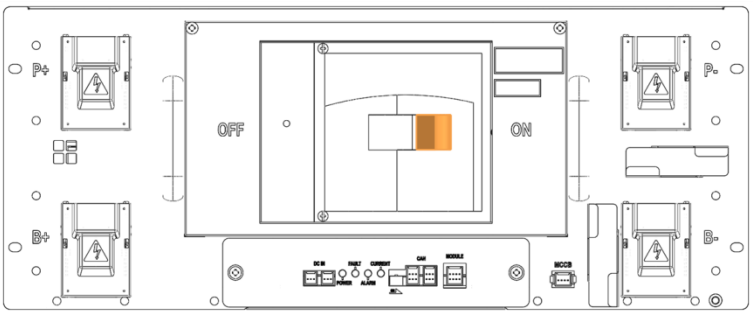


Figure 3-113: MCCB Handle in On Position

Memo

Memo

Memo

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