LIB System for UPS
Installation Manual
(128S3P)
Read this manual carefully before starting to install the battery system. Keep these instructions for future reference.
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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 these 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

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1.5 Acronyms and Abbreviations

The following acronyms and abbreviations are used in this manual.

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<td>AED</td>
<td>Automated External Defibrillator</td>
</tr>
<tr>
<td>BMS</td>
<td>Battery Management System</td>
</tr>
<tr>
<td>EHS</td>
<td>Environmental Health and Safety</td>
</tr>
<tr>
<td>ESS</td>
<td>Energy Storage System</td>
</tr>
<tr>
<td>LOTO</td>
<td>LOCK OUT/TAG OUT</td>
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## 1. About this Manual

### Abbreviations

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<td>OT</td>
<td>Overtemperature</td>
</tr>
<tr>
<td>OVP</td>
<td>Overvoltage Protection</td>
</tr>
<tr>
<td>PCS</td>
<td>Power Conversion System</td>
</tr>
<tr>
<td>SMPS</td>
<td>Switched Mode Power Supply</td>
</tr>
<tr>
<td>SOC</td>
<td>State Of Charge</td>
</tr>
<tr>
<td>SOH</td>
<td>State Of Health</td>
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<tr>
<td>SG</td>
<td>Switchgear</td>
</tr>
<tr>
<td>UT</td>
<td>Undertemperature</td>
</tr>
<tr>
<td>UVP</td>
<td>Undervoltage Protection</td>
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<tr>
<td>UPS</td>
<td>Uninterruptible Power Supply</td>
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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.

<table>
<thead>
<tr>
<th>Battery Module Type A (Isometric Front/Rear)</th>
<th>Battery Module Type A (Front)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Battery Module Type A (Isometric Front/Rear)" /></td>
<td><img src="image2" alt="Battery Module Type A (Front)" /></td>
</tr>
</tbody>
</table>

*Figure 2-1: Front and Rear Views of the Battery Module Type A*
### 2. Product Description

<table>
<thead>
<tr>
<th>Battery Module Type B (Isometric Front/Rear)</th>
<th>Battery Module Type B (Front)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Battery Module Type B (Isometric Front/Rear)" /></td>
<td><img src="image2" alt="Battery Module Type B (Front)" /></td>
</tr>
</tbody>
</table>

**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.

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

Figure 2-4: Front and Rear Views of the Rack BMS Assembly
The switchgear provides an auxiliary breaker switch that can be connected to the building monitoring system.

![Auxiliary Breaker Switch](image)

**Figure 2-5: Auxiliary Breaker Switch**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Pin Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal Open</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Normal Close</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2-1: Extra Auxiliary Breaker Switch Connector Description**

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>J21SPM-04V-KX</td>
<td></td>
</tr>
<tr>
<td>Harness Housing</td>
<td>J21SF-04V-KX-L</td>
<td></td>
</tr>
<tr>
<td>Harness Terminal</td>
<td>SJ2F-01GF-P1.0</td>
<td>AWG 20–24</td>
</tr>
</tbody>
</table>

P+ and P- terminal blocks connect to the DC link from the UPS. Cable and lug terminals should be selected according to the terminal block’s size and material.

![Terminal Block Isometric View](image)

**Figure 2-6: Terminal Block Isometric View**
Table 2-2: Terminal Block Description

<table>
<thead>
<tr>
<th>Item</th>
<th>Detail</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducting Material</td>
<td>Cu</td>
<td>C1100</td>
</tr>
<tr>
<td>Insulating Material (Guide)</td>
<td>PA66</td>
<td>GF25%</td>
</tr>
<tr>
<td>Insulating Material (Cover)</td>
<td>PC</td>
<td></td>
</tr>
<tr>
<td>Conductive Area</td>
<td>32.5mm x 40.0mm</td>
<td>Calculated in accordance with DIN 43670 MELSON &amp; BOTH equation</td>
</tr>
<tr>
<td>Rated Current</td>
<td>473A</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2-7: Terminal Block Front / Top View (Cover Opened/Closed)
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:

<table>
<thead>
<tr>
<th>SMPS Assembly (Isometric Front)</th>
<th>SMPS Assembly (Isometric Rear)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Image of SMPS Assembly Front]</td>
<td>[Image of SMPS Assembly Rear]</td>
</tr>
</tbody>
</table>

Type A (with System BMS)

Type B (without System BMS)

Figure 2-8: Front and Rear Views of the SMPS Assembly
SMPS Assembly provides several communication protocols, RS485, TCP/IP and Dry Contact

Table 2-3: Dry Contact Connector Description

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>S12B-J11DK-TXR</td>
<td>JST</td>
</tr>
<tr>
<td>Harness Housing</td>
<td>J11DF-12V-KX</td>
<td>-</td>
</tr>
<tr>
<td>Harness Terminal</td>
<td>SF1F-21T-P0.6</td>
<td>AWG 18~22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Pin Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Major Common</td>
<td>Overvoltage Protection</td>
</tr>
<tr>
<td>A1</td>
<td>Major Normally Closed</td>
<td>Undervoltage Protection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overtemperature Protection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overcurrent Protection</td>
</tr>
<tr>
<td>B2</td>
<td>Major Normally Open</td>
<td>Voltage Imbalance Error</td>
</tr>
<tr>
<td>A2</td>
<td>Minor Common</td>
<td>Voltage Sensing Error</td>
</tr>
<tr>
<td>B3</td>
<td>Minor Normally Closed</td>
<td>Undertemperature Protection</td>
</tr>
<tr>
<td>B4</td>
<td>MCCB Status Common</td>
<td>Temperature Imbalance Error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication Error</td>
</tr>
<tr>
<td>A4</td>
<td>MCCB Status Normally Closed</td>
<td>All MCCB’s are off: A4, B4 is closed</td>
</tr>
<tr>
<td>B5</td>
<td>MCCB Status Normally Open</td>
<td>One of the MCCB’s is on: B5, B4 is closed</td>
</tr>
<tr>
<td>A5</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>B6</td>
<td>Input</td>
<td>Set Condition: UPS opens B6, A6 contacts for more than 3 seconds.</td>
</tr>
<tr>
<td>A6</td>
<td>GND</td>
<td>Action: Battery MCCB Trip</td>
</tr>
</tbody>
</table>
### Table 2-4: TCP/IP Connector Description

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>VS-08-BU-RJ45/LP-1</td>
<td>PHOENIX CONTACT</td>
</tr>
<tr>
<td>Harness Housing</td>
<td>RJ45</td>
<td>-</td>
</tr>
<tr>
<td>Harness Terminal</td>
<td>RJ45</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Pin Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TX+</td>
<td>TCP/IP TX+</td>
</tr>
<tr>
<td>2</td>
<td>TX-</td>
<td>TCP/IP TX-</td>
</tr>
<tr>
<td>3</td>
<td>RX+</td>
<td>TCP/IP RX+</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>RX-</td>
<td>TCP/IP RX-</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>8</td>
<td>GND</td>
<td>GND</td>
</tr>
</tbody>
</table>

### Table 2-5: AC Terminal Description

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal Block</td>
<td>SL3T-4P</td>
<td>Seoil Electronics</td>
</tr>
<tr>
<td>Terminals</td>
<td>Ring Terminal</td>
<td>320 ~ 575VAC, 6A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Pin Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L1</td>
<td>3 Phase AC, L1</td>
</tr>
<tr>
<td>2</td>
<td>L2</td>
<td>3 Phase AC, L2</td>
</tr>
<tr>
<td>3</td>
<td>L3</td>
<td>3 Phase AC, L3</td>
</tr>
<tr>
<td>4</td>
<td>PE</td>
<td>Protective Earth</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Front Rack Frame</th>
<th>Rear Rack Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Front Rack Frame Image]</td>
<td>![Rear Rack Frame Image]</td>
</tr>
</tbody>
</table>

Figure 2-11: 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 CO₂ 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 3-105: 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 in
Table 3-1.
### 3. Installing the Product

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Step</th>
<th>Estimated Time (HH:MM)</th>
<th>Aggregated Time (HH:MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unpacking</td>
<td>00:30</td>
<td>00:30</td>
</tr>
<tr>
<td>2</td>
<td>Inspection</td>
<td>01:00</td>
<td>01:30</td>
</tr>
<tr>
<td>3</td>
<td>Rack Anchoring</td>
<td>04:00</td>
<td>05:30</td>
</tr>
<tr>
<td>4</td>
<td>Rack Installation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Battery Module</td>
<td>00:20</td>
<td>05:50</td>
</tr>
<tr>
<td></td>
<td>Switchgear Assembly</td>
<td>00:10</td>
<td>06:00</td>
</tr>
<tr>
<td></td>
<td>SMPS Assembly</td>
<td>00:10</td>
<td>06:10</td>
</tr>
<tr>
<td></td>
<td>Busbar</td>
<td>01:00</td>
<td>07:10</td>
</tr>
<tr>
<td></td>
<td>Signal Cables</td>
<td>00:20</td>
<td>07:30</td>
</tr>
<tr>
<td></td>
<td>Power and Control Cables</td>
<td>00:20</td>
<td>07:50</td>
</tr>
<tr>
<td></td>
<td>Rack Fuse Installation</td>
<td>00:30</td>
<td>08:20</td>
</tr>
<tr>
<td></td>
<td>AC Input Installation</td>
<td>00:20</td>
<td>08:40</td>
</tr>
<tr>
<td></td>
<td>Cable Installation</td>
<td>00:10</td>
<td>08:50</td>
</tr>
<tr>
<td></td>
<td>BMS Configuration</td>
<td>00:10</td>
<td>09:00</td>
</tr>
</tbody>
</table>
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 128S 3P Rack**

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Part No.</th>
<th>Amount (Unit: EA)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RACK FRAME</td>
<td>SJ94-00265B</td>
<td>3</td>
<td>Remove side covers from between frames bolted together.</td>
</tr>
<tr>
<td>2</td>
<td>MODULE A Type</td>
<td>ELPM182-00001</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>MODULE B Type</td>
<td>ELPM182-00002</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SWITCHGEAR</td>
<td>ELPJ513-00002</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>SMPS ASSEMBLY</td>
<td>ELPD131-00002</td>
<td>2</td>
<td>For Rack #2, #3</td>
</tr>
<tr>
<td>6</td>
<td>SMPS ASSEMBLY (WITH SYSTEM BMS ASSEMBLY)</td>
<td>ELPD131-00004</td>
<td>1</td>
<td>For Rack #1</td>
</tr>
<tr>
<td>7</td>
<td>BUSBAR, BUSBAR M TO SG</td>
<td>SJ66-00927A</td>
<td>6</td>
<td>Connect Module and Switchgear</td>
</tr>
<tr>
<td>8</td>
<td>BUS-BAR MAIN</td>
<td>SJ66-00863A</td>
<td>42</td>
<td>High Current Connection for Modules</td>
</tr>
<tr>
<td>9</td>
<td>RACKFUSE BUSBAR_R_128S</td>
<td>SJ66-00866A</td>
<td>3</td>
<td>Connect Module between #8 and #9.</td>
</tr>
<tr>
<td>10</td>
<td>RACKFUSE BUSBAR_L_128S</td>
<td>SJ66-00867A</td>
<td>3</td>
<td>Connect Module between #8 and #9.</td>
</tr>
<tr>
<td>11</td>
<td>FUSE</td>
<td>3601-001835</td>
<td>3</td>
<td>Connect Module between #8 and #9.</td>
</tr>
<tr>
<td>12</td>
<td>FUSE COVER</td>
<td>SJ63-00101A</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>WIRE ASSY RACK TO MODULE SHIELDING</td>
<td>SJ39-00472A</td>
<td>3</td>
<td>Connect Module and Switchgear</td>
</tr>
<tr>
<td>14</td>
<td>WIRE ASSY MODULE TO MODULE #1</td>
<td>SJ39-00673A</td>
<td>42</td>
<td>Signal Connection for Modules</td>
</tr>
<tr>
<td>15</td>
<td>WIRE ASSY RACK TO RACK #2</td>
<td>SJ39-00674A</td>
<td>2</td>
<td>Connect Rack between #1, #2 and #3.</td>
</tr>
<tr>
<td>16</td>
<td>WIRE ASSY RACK TO SYSTEM</td>
<td>SJ39-00719A</td>
<td>1</td>
<td>Connect the Rack BMS CAN B to System BMS CAN A connector in the SMPS ASSEMBLY.</td>
</tr>
<tr>
<td>17</td>
<td>WIRE ASSY RACK TO SMPS</td>
<td>SJ39-00718A</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>WIRE ASSY MODULE TO MODULE #2</td>
<td>SJ39-00678A</td>
<td>3</td>
<td>Signal Connect Module between #8 and #9</td>
</tr>
<tr>
<td>19</td>
<td>WIRE ASSY EARTH</td>
<td>SJ39-00725A</td>
<td>6</td>
<td>Connecting SMPS Assembly and Switchgear to Rack Frame.</td>
</tr>
<tr>
<td>20</td>
<td>SCREW M5 X 10</td>
<td>SJ60-00082A</td>
<td>38</td>
<td>Mounting SG, SMPS, WIRE ASSY EARTH and SIDE COVER, HALF to Rack Frame</td>
</tr>
<tr>
<td>21</td>
<td>SCREW M8 X 16</td>
<td>SJ60-00127A</td>
<td>96</td>
<td>Mounting Busbar to Module</td>
</tr>
<tr>
<td>22</td>
<td>SCREW M12 X 25</td>
<td>SJ60-00138A</td>
<td>12</td>
<td>Mounting Busbar to Switchgear</td>
</tr>
<tr>
<td>23</td>
<td>SCREW M12 X 16</td>
<td>SJ60-00137A</td>
<td>6</td>
<td>Mounting Rackfuse Busbar to Fuse</td>
</tr>
<tr>
<td>24</td>
<td>SCREW M10 X 25</td>
<td>SJ60-00082A</td>
<td>8</td>
<td>Mounting Rack Frame to Rack Frame side by side</td>
</tr>
<tr>
<td>25</td>
<td>NUT M10</td>
<td>SJ81-01268A</td>
<td>8</td>
<td>Mounting Rack Frame to Rack Frame side by side</td>
</tr>
<tr>
<td>26</td>
<td>M10 FLAT WASHER</td>
<td>SJ60-00073A</td>
<td>8</td>
<td>Mounting Rack Frame to Rack Frame side by side</td>
</tr>
</tbody>
</table>
## 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>
<thead>
<tr>
<th>Wire No.</th>
<th>Terminal Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 sq mm or thicker</td>
<td>M12 2 Hole Ring Terminal</td>
</tr>
</tbody>
</table>

### 3.5.2 Ground Wire Fasteners

Specifications for the ground wire fastening screws are:

<table>
<thead>
<tr>
<th>Size</th>
<th>Hardness</th>
<th>Thread Pitch</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12–30L</td>
<td>70 (Grade 7)</td>
<td>1.25 mm (0.05 in)</td>
<td>SS304</td>
</tr>
</tbody>
</table>

### 3.5.3 Rack Fasteners (Anchors)

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

<table>
<thead>
<tr>
<th>Size</th>
<th>Hardness</th>
<th>Thread Pitch</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>M16–L</td>
<td>70 (Grade 7)</td>
<td>2.0 mm (0.08 in)</td>
<td>SS304</td>
</tr>
</tbody>
</table>

### 3.5.4 Multiple Rack Fasteners

Rack fasteners are factory-provided. Refer to Table 3-2: Parts for 128S 3P Rack for part number and quantities.

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

<table>
<thead>
<tr>
<th>Size</th>
<th>Hardness</th>
<th>Thread Pitch</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>M10–25L</td>
<td>70 (Grade 7)</td>
<td>1.5 mm (0.06 in)</td>
<td>SS304</td>
</tr>
</tbody>
</table>

---

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Usage</th>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power Screwdriver/Drill</td>
<td>To fasten switchgear and SMPS assemblies to the rack frames</td>
<td><img src="image1" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td>(Max torque: 26Nm/270 kgf/cm)</td>
<td>5.1–6.1Nm/50–60 kgf/cm</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Torque Limiter</td>
<td>For use with torque wrench</td>
<td><img src="image2" alt="Image" /></td>
</tr>
<tr>
<td>3</td>
<td>Phillips Screwdriver or Bit</td>
<td>To fasten switchgear and SMPS assemblies to the rack frames</td>
<td><img src="image3" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(M5 Tip)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Box Cutter</td>
<td>Opening boxes</td>
<td><img src="image4" alt="Image" /></td>
</tr>
<tr>
<td>5</td>
<td>Forklift</td>
<td>Moving rack frames and pallets containing modules and switchgear</td>
<td><img src="image5" alt="Image" /></td>
</tr>
<tr>
<td>6</td>
<td>Insulated Torque Wrench</td>
<td>Installing a high-current cable (10~50 N.m / 100 ~ 500 kgf.cm)</td>
<td><img src="image6" alt="Image" /></td>
</tr>
<tr>
<td>7</td>
<td>Insulated Sockets</td>
<td>Installing power cables and busbars</td>
<td><img src="image7" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td>(13 mm, 17mm and 19mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Insulated Extension for Socket</td>
<td>Installing a power cable</td>
<td><img src="image8" alt="Image" /></td>
</tr>
<tr>
<td>9</td>
<td>Inclinometer/Level</td>
<td>Installing a rack frame</td>
<td><img src="image9" alt="Image" /></td>
</tr>
</tbody>
</table>
## 3. Installing the Product

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Usage</th>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Battery Tester</td>
<td>Measure battery module’s voltage and internal impedance</td>
<td>![Battery Tester Image]</td>
</tr>
</tbody>
</table>
3.7 Preparation Stage—Visual Inspection

During visual inspection, the inspector should check for:

![Diagram showing faulty cases](image)

**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

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Voltage Check</td>
<td>28.712 ~ 29.104V</td>
</tr>
<tr>
<td>2</td>
<td>Internal Impedance Check</td>
<td>3.0 ~ 4.3 mΩ</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use a proper transportation method considering the weight of the rack frame.</td>
</tr>
<tr>
<td>• Ensure that the safety of the working place is maintained.</td>
</tr>
<tr>
<td>• When using a forklift, lift the rack frame from the front.</td>
</tr>
<tr>
<td>• When a forklift cannot be used, use a mechanical lift or move it by hand with three or more people.</td>
</tr>
<tr>
<td>• Use lock washers to prevent bolts from loosening.</td>
</tr>
<tr>
<td>• Use an inclinometer or carpenter’s level to ensure that the rack frame is plumb.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Failure to anchor the rack frame on a flat and level surface may distort the rack frame after installing the racks side-by-side.</td>
</tr>
<tr>
<td>• Frame distortion may make the rack doors difficult or impossible to open.</td>
</tr>
</tbody>
</table>

Racks must be placed according to the clearance distances listed in the figures below. The clearance distances are for proper ventilation and cooling of the battery, and for the ease of installation and service.

![Figure 3-3: Clearance Distance for Single Rack Frame](image)

Figure 3-3 : Clearance Distance for Single Rack Frame
3. Installing the Product

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.

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.

Figure 3-4: Clearance Distance for Multiple Rack Frames

Figure 3-5: Clearance Distance for Multiple Rack Frames Installed Rear-to-Rear
3. Installing the Product

**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.

---

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).

---

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).
3. Installing the Product

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

<table>
<thead>
<tr>
<th>WARNING</th>
<th>Arc Flash and Shock Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insulated tools are required for any work on this energized equipment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING</th>
<th>Sharp Edges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wear gloves and other protective gear to prevent injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING</th>
<th>Pinch Point</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use caution when working in the enclosure to prevent injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
<th>Heavy Object</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Can cause muscle strain or back injury. Use lifting aids and proper lifting techniques when moving trays, batteries and other heavy objects.</td>
</tr>
</tbody>
</table>
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](image)

2. After all Switchgear Assemblies are inserted in the rack frame, 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](image)

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

**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

<table>
<thead>
<tr>
<th>Important</th>
</tr>
</thead>
</table>
| - Attach the inserted SMPS Assemblies to the rack frames by fastening each with four M5 x 10L screws  
- (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.

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])
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.

<table>
<thead>
<tr>
<th>Important</th>
</tr>
</thead>
</table>
| • 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. |

Two Type B Battery Modules

Figure 3-16: Insertion of Modules on the Ninth Shelf from the Bottom
Two Type B Battery Modules
Two Type A Battery Modules

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

Two Type B Battery Modules
Two Type A Battery Modules
Two Type B Battery Modules
Two Type A Battery Modules
Two Type B Battery Modules
Two Type A Battery Modules
Two Type B Battery Modules
Two Type A Battery Modules

Figure 3-18: Battery Module Arrangement
3. Installing the Product

**Important**
- Samsung recommends installing modules from top to bottom.
- The bottom shelf (#1) is empty, as shown in Figure 3-20.

![Figure 3-19: Module Number](image)

![Figure 3-20: No Battery Modules on First Shelf](image)
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.**

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Please follow the instructions to protect the module BMS against damage.</td>
</tr>
<tr>
<td>• Important: DO NOT deviate from the sequence of steps below.</td>
</tr>
<tr>
<td>• 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.</td>
</tr>
<tr>
<td>• 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.</td>
</tr>
<tr>
<td>• 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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Connect the power busbar with an M8 screw for battery module terminals</td>
</tr>
<tr>
<td>• The fastening torque should be 8.16–11.94 Nm (80–117 kgf/cm).</td>
</tr>
<tr>
<td>• Use an insulated torque wrench extension with a 13 mm socket.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Connect the power bus-bar with an M12 screw for switchgear terminals</td>
</tr>
<tr>
<td>• The fastening torque should be 30 Nm/300 kgf·cm.</td>
</tr>
<tr>
<td>• Use an insulated torque wrench extension with a 19 mm socket.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 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.</td>
</tr>
<tr>
<td>• 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.</td>
</tr>
</tbody>
</table>
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](image1)

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-](image2)
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.

![Diagram showing connection process](image)

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

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

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 3-49: 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

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.
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

![Figure 3-61: Connect Battery Module #14 B+ and Battery Module #15 B-](image-url)
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 Switchgear's B+ terminal cover.

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

Figure 3-66: Remove Switchgear B+ Terminal Cover
33. Connect Switchgear B+ and Battery Module #16 B+ using “BUSBAR_BUSBAR M TO SG.” Switchgear B+ terminal is connected using an M12 screw and Module #16 B+ terminal is connected using an M8 screw.

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

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

Figure 3-68: 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 3-69: Rack BMS to Module #1 OUT Signal Cable](image)
2. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1” from Module #1 “IN” to Module #2 “OUT.”
3. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1” from Module #2 “IN” to Module #3 “OUT.”

Figure 3-72: 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 3-73: 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 3-74: Module #4 to Module #5 Signal Cabling](image)

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

![Figure 3-75: Module #5 to Module #6 Signal Cabling](image)
7. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1” from Module #6 “IN” to Module #7 “OUT.”

Figure 3-76: 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 3-77: 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 3-78: Module #11 to Module #12 Signal Cabling](image)

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

![Figure 3-79: Module #12 to Module #13 Signal Cabling](image)
11. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1” from Module #13 “IN” to Module #14 “OUT.”

12. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1” from Module #14 “IN” to Module #15 “OUT.”
13. Connect the signal cable “WIRE ASSY MODULE TO MODULE #1” from Module #15 “IN” to Module #16 “OUT.”

Figure 3-82: Module #15 to Module #16 Signal Cabling
14. 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 3-83: Pre-Punched Hole for Signal Cable](image-url)
Signal Cabling Examples of Left Alignment of Trays

Figure 3-84: Signal Cabling Examples of Left Alignment of Switchgear

Figure 3-85: Openings for Cable

15. Turn the termination resistor switch on for the last Switchgear in the CANbus loop.
Figure 3-86: 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 3-87: DC Power Cables from SMPS Assembly Type A to Switchgear

Figure 3-88: 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 3-89: CAN Signal Cable Connection from SMPS Assembly to Switchgear

1. Connect the SMPS Assembly TCP/IP Cable\(^4\) to the SMPS Assembly.

Figure 3-90: 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 Cable⁵.

![Figure 3-91: Dry Contact Cable Connection to SMPS Assembly](image)

3. Connect the Switchgear MCCB Cable⁶.

![Figure 3-92: MCCB Extra Auxiliary Connection](image)

---

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 3-93: AC Input Terminals](image)

2. Connect each AC input in the SMPS Assembly. Make sure the AC cables are not energized.\(^7\)

![Figure 3-94: AC Input Terminals with Cables Attached](image)

---

\(^7\) 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 3-95: 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 3-96: Remove Front Covers from Battery Modules #8 and #9
2. Reattach the Rack Fuse Busbar Assembly: one “RACKFUSE BUSBAR_R_128S”, one “RACKFUSE BUSBAR_L_128S”, 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 3-97: Rack Fuse Busbar Assembly.
3. Assemble Rack Fuse Cover “FUSE COVER.”

Figure 3-98: Rack Fuse Cover

Figure 3-99: Rack Fuse Cover (Fully Assembled; Front View)
3. Installing the Product

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

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

Figure 3-102: Battery Module #7 to Battery Module #8 Signal Cabling

Figure 3-103: Battery Module #8 to Battery Module #9 Signal Cabling (WIRE ASSY MODULE TO MODULE #2)
Figure 3-104: Battery Module #9 to Battery Module #10 Signal Cabling
3.9.9 DC Link Cable Connection

1. Connect the ground cables.

![Figure 3-105: Grounding Points (2 EA)](image)

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

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 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.</td>
</tr>
<tr>
<td>• The fastening torque should be 30Nm (300kgf·cm).</td>
</tr>
</tbody>
</table>

![Figure 3-106: Connection of Ground Cable for Multiple Rack Frames](image)
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).

After installation is complete, check the following:

- Bolt fastening condition
3. **Installing** the Product

- 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.

![MCCB Handle in Trip Position](image1.png)

**Figure 3-108: MCCB Handle in Trip Position**

Shift the handle of the MCCB to “OFF.”

![MCCB Handle in Off Position](image2.png)

**Figure 3-109: MCCB Handle in Off Position**

Then shift the handle to “ON” to connect the battery system to the UPS DC link.
Figure 3-110: MCCB Handle in On Position
3.9.12 BMS Configuration

**NOTICE**

- It is recommended that the configuration of the Rack BMS and System BMS be done by experienced service personnel. Incorrect configuration of the Rack BMS and System BMS will cause communication failure.

Prepare the following items and configure the Rack BMS and System BMS.

Table 3-9: Required Items for BMS Configuration

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Appearance</th>
<th>Comments</th>
</tr>
</thead>
</table>
| 1   | Rack BMS ID Writer Cable             | ![Image](image1) | J21SF-06V-KX-L (6 pin) and D-SUB female (9 pin)  
Connect between Rack BMS and USB-to-CAN device.  
Must be made by customer or installer as described below  
(Table 3-10: Rack BMS ID Writing Cable Pin Map) |
| 2   | System BMS Configuration Cable       | ![Image](image2) | RJ45 (8 pin) and D-SUB female (9 pin)  
Connect between System BMS and USB-to-CAN device.  
Must be made by the customer or installer as described below  
(Table 3-11: System BMS Configuration Cable Pin Map) |
| 3   | Ethernet Cable                       | ![Image](image3) | RJ45 (8 pin) and RJ45 (8 pin)  
Must be made by the customer or installer as described below  
(Table 3-12: System BMS Communication Cable Pin Map) |
| 4   | IXXAT USB-to-CAN V2                  | ![Image](image4) | Must be provided by the customer or installer.  
Driver must be installed on the computer. |
| 5   | Notebook PC  
Windows 7 SP1 (English) recommended | ![Image](image5) | Must be provided by customer or installer.  
Service Pack: SP1  
Minimum hardware requirements  
- 1 GHz of faster 32-bit processor  
- 1 GB RAM (32-bit) or 2 GB RAM (64-bit)  
- Hard disk with 16 GB (32-bit) or 20 GB (64-bit) |
3. Installing the Product

NOTICE

- The Rack BMS ID writing cable, System BMS configuration cable and Ethernet cable must be made by the customer or installer according to the following PIN map.

![Diagram of Rack BMS ID Writing Cable Pin Map]

Figure 3-111: Rack BMS ID Writing Cable Pin Map

Table 3-10: Rack BMS ID Writing Cable Pin Map

<table>
<thead>
<tr>
<th>Connector</th>
<th>Pin No.</th>
<th>Signal</th>
<th>Connector</th>
<th>Pin No.</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-SUB (Female)</td>
<td>1</td>
<td>-</td>
<td>1A</td>
<td>GND Ground</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>CAN Low</td>
<td>2A</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>CAN Ground</td>
<td>3A</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>-</td>
<td>1B</td>
<td>CAN High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>-</td>
<td>2B</td>
<td>CAN Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>-</td>
<td>3B</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>CAN High</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Installing the Product

Figure 3-112: System BMS Configuration Cable Pin Map

Table 3-11: System BMS Configuration Cable Pin Map

<table>
<thead>
<tr>
<th>Connection A</th>
<th>Connection B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connector</strong></td>
<td><strong>Pin No.</strong></td>
</tr>
<tr>
<td>D-SUB (Female)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

**NOTICE**

- A 120 Ω termination resistor must be inserted between the pins for No. 2 and No. 7 in the D-SUB (Female).

Figure 3-113: System BMS Communication Cable Pin Map

Table 3-12: System BMS Communication Cable Pin Map

<table>
<thead>
<tr>
<th>Connection A</th>
<th>Connection B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connector A</strong></td>
<td><strong>Pin No.</strong></td>
</tr>
<tr>
<td>RJ45</td>
<td>1</td>
</tr>
</tbody>
</table>
### 3. Installing the Product


<table>
<thead>
<tr>
<th>Connection A</th>
<th>Pin No.</th>
<th>Signal</th>
<th>Connection B</th>
<th>Pin No.</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector A</td>
<td>2</td>
<td>Tx-</td>
<td>Connector B</td>
<td>2</td>
<td>Tx-</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Rx+</td>
<td></td>
<td>3</td>
<td>Rx+</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>-</td>
<td></td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>-</td>
<td></td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Rx-</td>
<td></td>
<td>6</td>
<td>Rx-</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>-</td>
<td></td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>-</td>
<td></td>
<td>8</td>
<td>-</td>
</tr>
</tbody>
</table>
3.9.12.1 Rack BMS Configuration

1. Set the Rack BMS CAN ID and the number of modules in a single rack.

**Important**
- If multiple racks are installed, the Rack BMS CAN ID’s must be set individually.
- Turn off all other Rack BMS by disconnecting the Switchgear DC power cable while configuring the Rack BMS.
- Reconnect all Switchgear DC power cables after configuring all Rack BMS units.
2. Run “ELP_MON.exe” after turning on the Rack BMS. This program is factory-provided.

![Image of ELP_MON](image)

Figure 3-116: Rack and System Monitoring Program

3. Click the INSTALL(①) tab for installation.

![Image of Monitoring Program Window](image)

Figure 3-117: Monitoring Program Window

4. In the INSTALL tab, select [RACK] (①) and select the appropriate Device HW number and click ‘CONNECT’(②).
   
   When connection is complete, the button text changes from ‘CONNECT’ to ‘DISCONNECT’(③).
5. If any item's value must be changed, click the cell under 'Write Value' column, type in the new value and check the checkbox [V] (①To change the value of all racks, check the 'Default ID;' to change a single rack's value of Item, uncheck the 'Default ID' and select ID(②). After entering the new values under 'Write Value' column, click the
‘WRITE VALUE’ button (3). When you click the button, the same value automatically appears in ‘Read Value’ column. Finally, after clicking ‘APPLY[RESET BMS]’, Rack BMS reboots and the new value is applied(④).

Figure 3-121: RACK BMS Installation Setting Window

### Important

- **Number of Racks** is the total number of racks (strings) installed. The range is 1–128. If the value exceeds the limit, the function cannot operate.
- The value of the first rack is 1. This value depends on the order of the rack from the system BMS.
- For example, to set the second rack BMS, enter ‘2’ under ‘Write Value’ then CAN ID 2002 is written for the second rack BMS.
- **Number of Modules** is the number of modules connected to the Rack BMS. Its range is 1–32.
- For example, in case of 136S1P Rack, the value is 17.

6. Close “ELP_MON.exe” and disconnect all signal cables connecting the PC to the Rack BMS.
7. If multiple racks are installed, repeat Steps 1~6 for each rack.
3.9.12.2 System BMS Configuration

1. Connect both an Ethernet cable and a configuration cable from the system BMS to your computer as shown in the figure below.

![Figure 3-122: Cable Connections for System BMS Configuration](image)

2. Run "ELP_MON.exe" (This program is factory-provided.)

![Figure 3-123: Rack and System BMS Monitoring Program Icon](image)

3. Click the INSTALL(①) tab for installation.
4. In **INSTALL** window, select **[SYSTEM]** (①).

5. Select the appropriate Device HW number, and click **CONNECT** (②). When the connection is made, the button text changes to **DISCONNECT** (③).
6. If any value change is required, double-click the cell in Write Value and check the checkbox [V] (➊). If you completed to change the data of ‘Write Value’, click the ‘WRITE VALUE’ (➋). (The same value automatically appears in READ VALUE.)

7. Click ‘APPLY [RESET BMS]’ and the SBMS will reboot and apply the value that you changed (➌).

---

**Figure 3-126: System BMS Install Setting Window**

---

**Important**

- You must change the values in ➊ according to your system configuration.
- **Rack/Module Counter**: Number of racks and modules per rack displayed.
  - **Number of Racks**: Number of racks connected in parallel to the same UPS and connected to same System BMS
  - **Number of Modules**: Number of modules for each rack (e.g., 136S1P Rack has 17 modules)
- **Ethernet IP Address, Subnet Mask, Gateway, Port**: TCP/IP address and port (17.91.30.246/502 by default), subnet mask (255.255.224.0 by default) and gateway (17.91.1.2 by default) should be changed according to your network environment.
- **RTU Baudrate** (default value: 0), parity bit (default value: 1), slave ID (default value: 39)
- **Customer ID**: Set to 1
8. After configuration is finished, verify that the data in the System BMS is correct as shown below. Verify that the proper number of racks is displayed.

Figure 3-127: Check System BMS Items
3.9.13 Communication Check

After installation, wiring, and configuration are completed, check the communication status by connecting the TCP/IP cable and run the MODBUS program to see whether the System BMS shows the data of the Rack BMS correctly.

3.9.13.1 PC’s IP Setting for Communication with the System BMS

**NOTICE**

- The following guide for PC’s IP setting is made with Microsoft® Windows® 7. Other versions of Windows may be different.

1. Checking the Data of the System BMS requires changing the IP settings in the notebook PC to be used.

2. Click the “START” button in the desktop’s status bar (①) to open the Start menu.

3. Click “Network” (②). If “Network” menu is not available, click “Control Panel”

![Network menu example](image)

Figure 3-128: Open “Network”

4. When the Network window appears, click “Network and Sharing Center” (③).
3. Installing the Product

5. When the following window appears, click “Change adapter settings” (④).

Figure 3-129: Open “Network and Sharing Center”

Figure 3-130: Open “Change adapter settings”
6. When the Network connections window appears, right-click “Local Area Connection” (5). When the popup menu appears, click “Properties” (6).

![Figure 3-131: Open “Properties” for “Local Area Connection”](image)

7. When the Local Area Connection Properties window appears, select “Internet Protocol Version 4 (TCP/IPv4)” (7) and then click “Properties” (8).

![Figure 3-132: Open Properties for “Internet Protocol Version 4 (TCP/IPv4)”](image)
8. When the following window appears, change the "IP address" that fits the network environment (⑨).

Figure 3-133: Setting the Computer's IP address
3.9.13.2 System BMS Data Check

1. Run "ELP_MON.exe." (This program is factory-provided.)

![Figure 3-134: System BMS Monitoring Program Icon](image)

2. When the following window appears, set the following items:
   - Settings for TCP/IP and port (①)
     Refer to the TCP/IP and port settings entered during System BMS Configuration.
     (Section 3.9.12.2, Step 6 on Page 107)
   - Number of Racks: Number of racks connected in parallel to the same UPS and connected to same System BMS
   - Number of Modules: Number of modules for each rack (e.g., 136S1P Rack has 17 modules)

3. Click Connect (②).

![Figure 3-135: Main Window of Monitoring Program](image)
4. Check all the data of the rack (string) in the following window.

![Figure 3-136: Checking System BMS Data](image)