

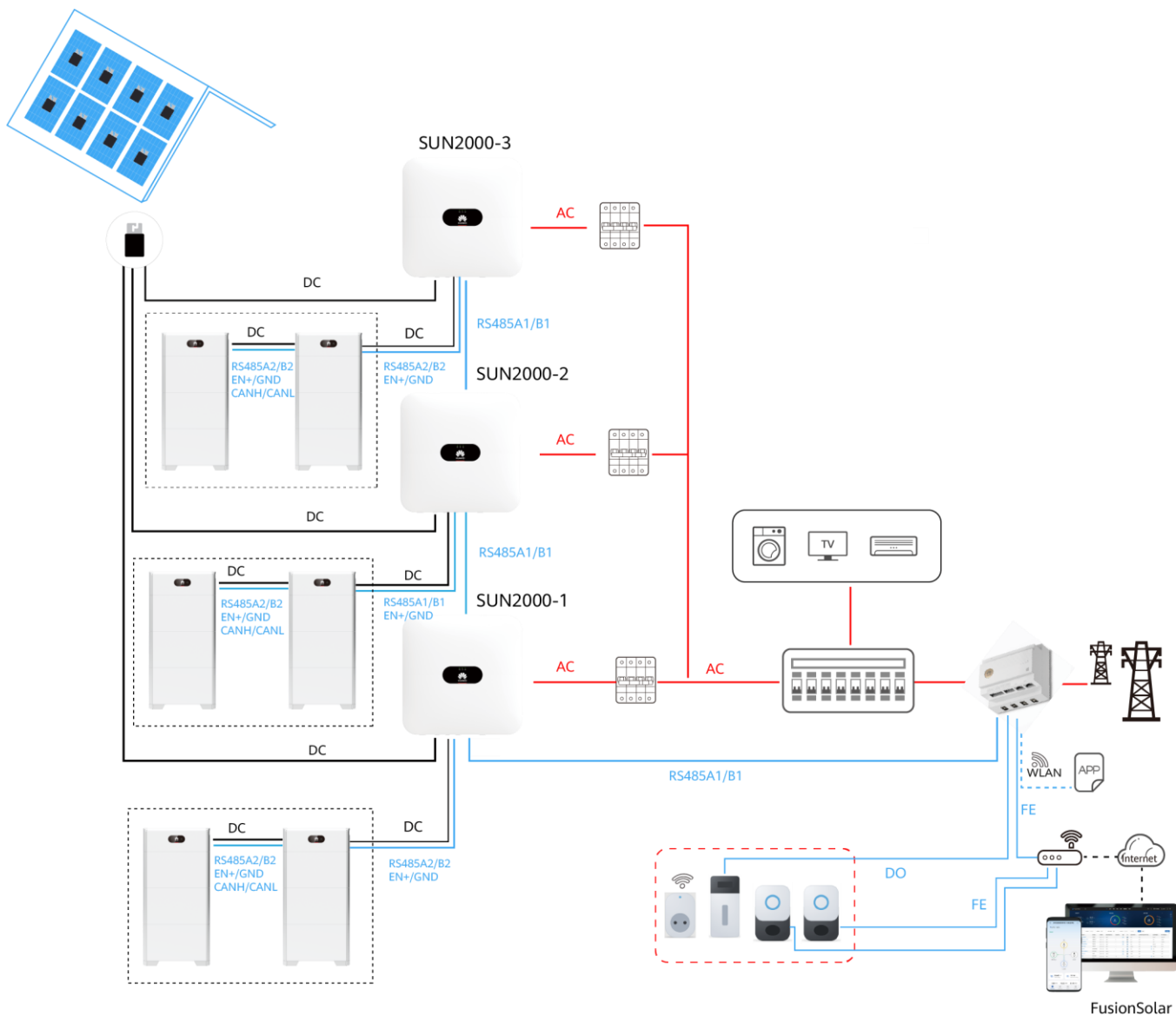
# Residential Smart PV Solution Quick Guide

(Three-Phase PV+ESS Scenario + EMMA Networking)

Issue: 05  
Date: 2024-07-15



## 1 Networking

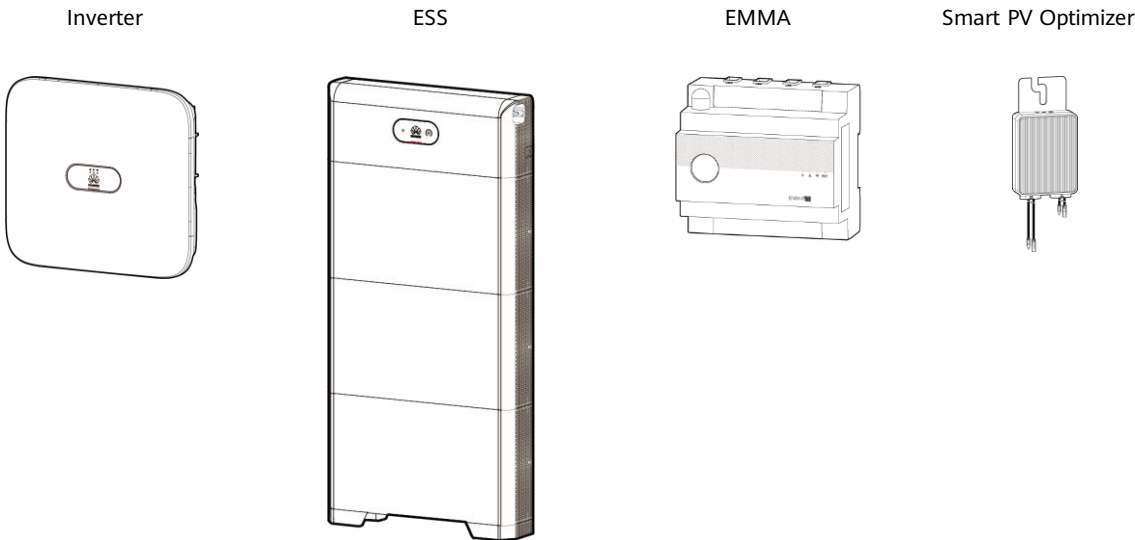


- NOTE**
- The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.
  - For details about the solution components, installation, and cable connections, see the corresponding user manuals and quick guides.
  - The cable colors involved in this document are for reference only. Select cables in accordance with local cable specifications.

**NOTE**

Both the EMMA and Smart Dongle provide communication capabilities. Only either of them can be installed in a power plant for networking. Otherwise, communication between devices will be abnormal.

## 2 Product Overview



| Component                   | Model                                                                                                                                                                                                                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inverter                    | SUN2000-(12KTL-25KTL)-MB0 series<br>SUN2000-(3KTL-12KTL)-M1<br>SUN2000-(8KTL-20KTL)-M2<br>SUN2000-(12KTL-25KTL)-M5 series<br>SUN2000-(5K-12K)-MAP0 series<br>SUN5000-(8KTL, 12KTL)-MAP0 series<br>SUN5000-(17K, 25K)-MB0 series | <ul style="list-style-type: none"><li>A maximum of three inverters can be cascaded.</li><li>M1/M2/M5/MB0 inverters can be cascaded.</li><li>The SUN2000-(5K-12K)-MAP0 cannot be cascaded with other inverters.</li><li>SUN5000 inverters cannot be cascaded with SUN2000 inverters.</li><li>Optimizers must be configured for all PV modules connected to a SUN5000 inverter. Otherwise, the inverter cannot be started.</li></ul>                                         |
| Energy storage system (ESS) | LUNA2000-(5-30)-S0<br>LUNA2000-(7, 14, 21)-S1                                                                                                                                                                                   | <ul style="list-style-type: none"><li>Each M1/MAP0 can connect to a maximum of two ESSs, and each MB0 can connect to a maximum of four ESSs. (each battery terminal can connect to a maximum of two batteries)</li><li>The LUNA2000-(5-30)-S0 and LUNA2000-(7, 14, 21)-S1 cannot connect to the same inverter in a parallel system.</li><li>If inverters are cascaded, the LUNA2000-(5-30)-S0 and LUNA2000-(7, 14, 21)-S1 cannot connect to different inverters.</li></ul> |
| EMMA                        | EMMA-A01<br>EMMA-A02                                                                                                                                                                                                            | <ul style="list-style-type: none"><li>A01: Only PV and ESS features are supported.</li><li>A02: Features of PV, ESSs, smart chargers, and smart loads are supported.</li></ul>                                                                                                                                                                                                                                                                                             |
| Smart PV Optimizer          | SUN2000-450W-P2<br>SUN2000-600W-P<br>MERC-600W-PA0<br>MERC-(1300W, 1100W)-P                                                                                                                                                     | For details about the optimizer supported by the inverter, see: <ul style="list-style-type: none"><li><a href="#">SUN2000 Smart PV Optimizer User Manual</a></li><li><a href="#">MERC-600W-PA0 Smart PV Optimizer User Manual</a></li><li><a href="#">MERC-(1300W, 1100W)-P Smart PV Optimizer User Manual</a></li></ul>                                                                                                                                                   |

**NOTE**

In the EMMA networking scenario, a maximum of three inverters and 12 ESSs can be connected.

# Residential Smart PV Solution Quick Guide

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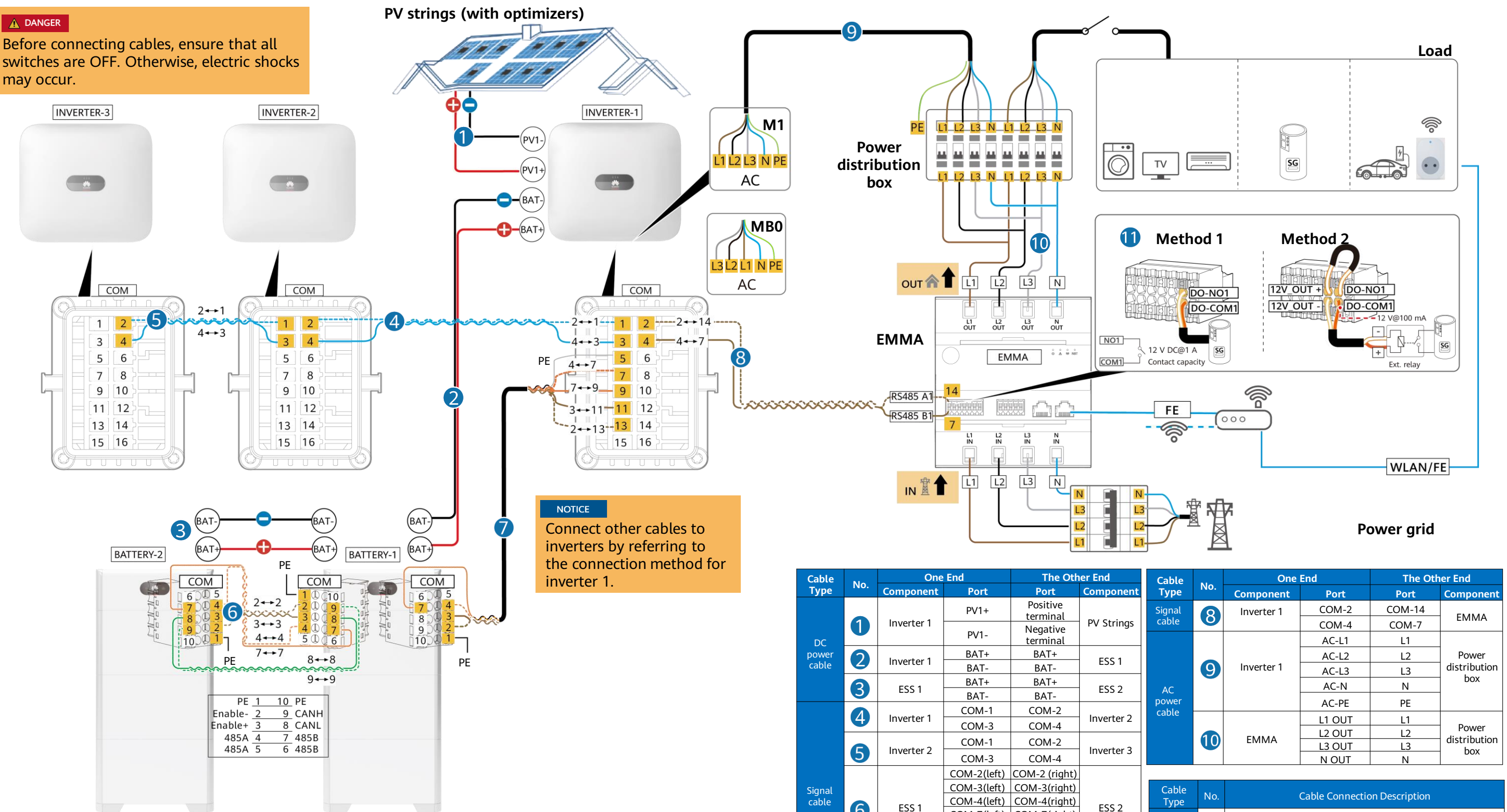


3

## Cable Connections (Three-Phase Inverter M1/MB0 + ESS S0 + EMMA with an Internal CT)

**DANGER**

Before connecting cables, ensure that all switches are OFF. Otherwise, electric shocks may occur.



**NOTICE**

Connect other cables to inverters by referring to the connection method for inverter 1.

**NOTICE**

Signal cables must be outdoor shielded twisted pair cables.

| Cable Type     | No. | One End Component | Port                 | The Other End Component      |
|----------------|-----|-------------------|----------------------|------------------------------|
| DC power cable | 1   | Inverter 1        | PV1+                 | Positive terminal            |
|                |     |                   | PV1-                 | Negative terminal            |
|                |     |                   |                      | PV Strings                   |
|                | 2   | Inverter 1        | BAT+                 | BAT+                         |
|                |     |                   | BAT-                 | BAT-                         |
|                |     |                   |                      | ESS 1                        |
|                | 3   | ESS 1             | BAT+                 | BAT+                         |
|                |     |                   | BAT-                 | BAT-                         |
|                |     |                   |                      | ESS 2                        |
| Signal cable   | 4   | Inverter 1        | COM-1                | COM-2                        |
|                |     |                   | COM-3                | COM-4                        |
|                |     |                   |                      | Inverter 2                   |
|                | 5   | Inverter 2        | COM-1                | COM-2                        |
|                |     |                   | COM-3                | COM-4                        |
|                |     |                   |                      | Inverter 3                   |
|                | 6   | ESS 1             | COM-2(left)          | COM-2(right)                 |
|                |     |                   | COM-3(left)          | COM-3(right)                 |
|                |     |                   | COM-4(left)          | COM-4(right)                 |
|                | 7   | Inverter 1        | COM-7(left)          | COM-7(right)                 |
|                |     |                   | COM-8(left)          | COM-8(right)                 |
|                |     |                   | COM-9(left)          | COM-9(right)                 |
|                |     |                   | COM-13               | COM-2(right)                 |
|                |     |                   | COM-11               | COM-3(right)                 |
|                |     |                   | COM-9                | COM-7(right)                 |
|                |     |                   | COM-5 (shield layer) | COM-1 (right) (shield layer) |
|                |     |                   |                      |                              |
|                |     |                   |                      |                              |

| Cable Type     | No. | One End Component | Port   | The Other End Component |
|----------------|-----|-------------------|--------|-------------------------|
| Signal cable   | 8   | Inverter 1        | COM-2  | COM-14                  |
| AC power cable | 9   | Inverter 1        | COM-4  | COM-7                   |
|                |     |                   | AC-L1  | L1                      |
|                |     |                   | AC-L2  | L2                      |
|                | 10  | EMMA              | AC-L3  | L3                      |
|                |     |                   | AC-N   | N                       |
|                |     |                   | AC-PE  | PE                      |
|                |     |                   | L1 OUT | L1                      |
|                |     |                   | L2 OUT | L2                      |
|                |     |                   | L3 OUT | L3                      |
|                |     |                   | N OUT  | N                       |
|                |     |                   |        |                         |
|                |     |                   |        |                         |

| Cable Type   | No. | Cable Connection Description                                                                                                                                                                                                                                                                                    |
|--------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Signal cable | 11  | Method 1: Use DO dry contacts to directly drive the SG Ready heat pump. The max. capability of the DO dry contacts is 12 V DC@1 A.<br>Method 2: Use a 12 V@30 mA power supply to drive the external relay. Choose the proper contact capability of the external relay according to the SG Ready heat pump port. |

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(Three-Phase PV+ESS Scenario + EMMA Networking)

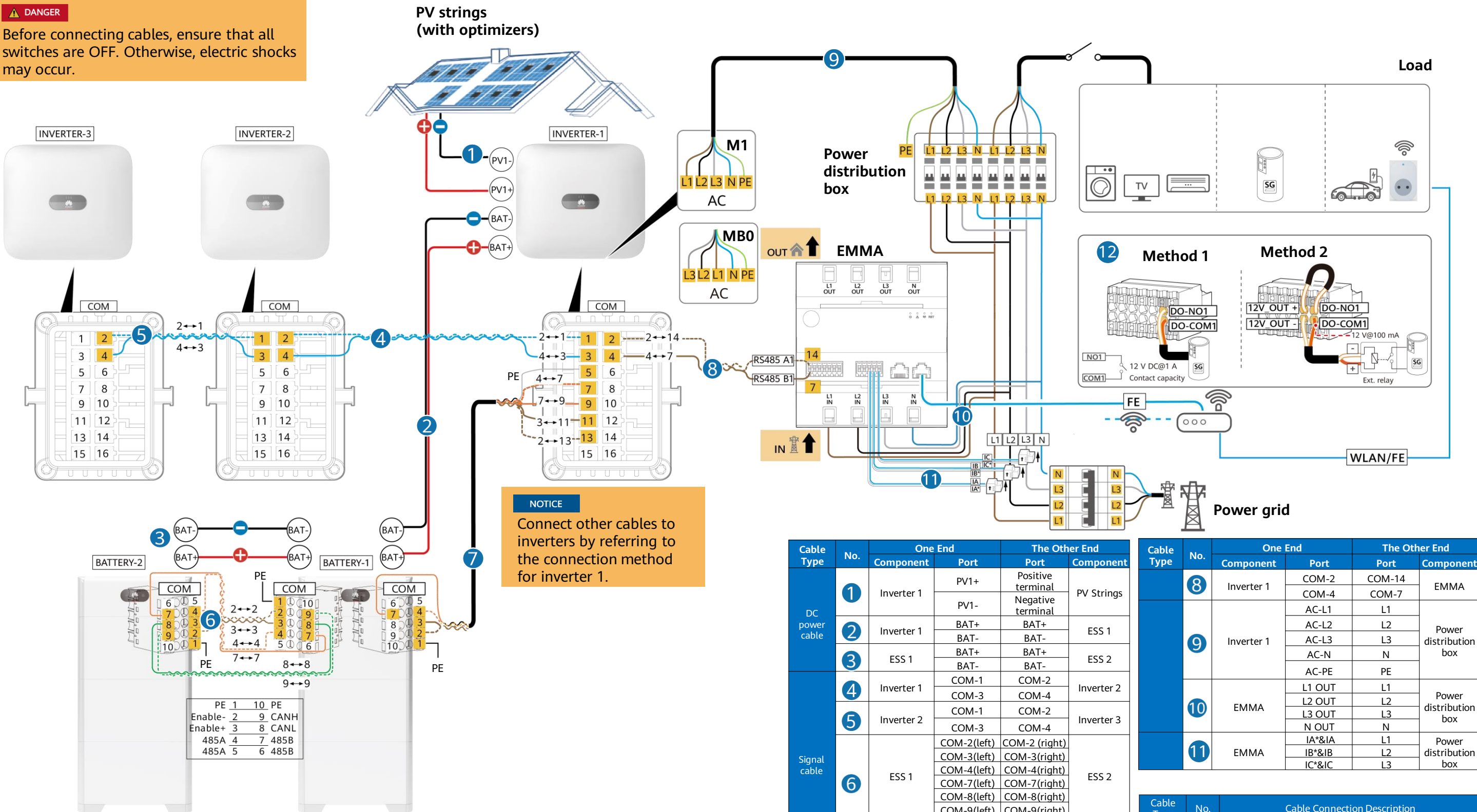


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## Cable Connections (Three-Phase Inverter M1/MB0 + ESS S0 + EMMA with an External CT)

**⚠ DANGER**

Before connecting cables, ensure that all switches are OFF. Otherwise, electric shocks may occur.



**NOTICE**

Connect other cables to inverters by referring to the connection method for inverter 1.

**NOTICE**

Signal cables must be outdoor shielded twisted pair cables.

| Cable Type     | No. | One End    |             | The Other End     |            |
|----------------|-----|------------|-------------|-------------------|------------|
|                |     | Component  | Port        | Port              | Component  |
| DC power cable | 1   | Inverter 1 | PV1+        | Positive terminal | PV Strings |
|                |     |            | PV1-        | Negative terminal |            |
|                | 2   | Inverter 1 | BAT+        | BAT+              | ESS 1      |
|                |     |            | BAT-        | BAT-              |            |
| Signal cable   | 3   | ESS 1      | BAT+        | BAT+              | ESS 2      |
|                | 4   | Inverter 1 | COM-1       | COM-2             | Inverter 2 |
|                |     |            | COM-3       | COM-4             |            |
|                | 5   | Inverter 2 | COM-3       | COM-4             | Inverter 3 |
|                | 6   | ESS 1      | COM-2(left) | COM-2(right)      | ESS 2      |
|                |     |            | COM-3(left) | COM-3(right)      |            |
|                |     |            | COM-4(left) | COM-4(right)      |            |
|                |     |            | COM-7(left) | COM-7(right)      |            |
|                |     |            | COM-8(left) | COM-8(right)      |            |
|                | 7   | Inverter 1 | COM-9(left) | COM-9(right)      | ESS 1      |
|                |     |            | COM-13      | COM-2(right)      |            |
|                |     |            | COM-11      | COM-3(right)      |            |
|                |     |            | COM-7       | COM-4(right)      |            |

| Cable Type | No. | One End    |        | The Other End |                        |
|------------|-----|------------|--------|---------------|------------------------|
|            |     | Component  | Port   | Port          | Component              |
|            | 8   | Inverter 1 | COM-2  | COM-14        | EMMA                   |
|            |     |            | COM-4  | COM-7         |                        |
|            | 9   | Inverter 1 | AC-L1  | L1            | Power distribution box |
|            |     |            | AC-L2  | L2            |                        |
|            |     |            | AC-L3  | L3            |                        |
|            |     |            | AC-N   | N             |                        |
|            | 10  | EMMA       | AC-PE  | PE            | Power distribution box |
|            |     |            | L1 OUT | L1            |                        |
|            |     |            | L2 OUT | L2            |                        |
|            |     |            | L3 OUT | L3            |                        |
|            | 11  | EMMA       | N OUT  | N             | Power distribution box |
|            |     |            | IA*&IA | L1            |                        |
|            |     |            | IB*&IB | L2            |                        |
|            |     |            | IC*&IC | L3            |                        |

| Cable Type   | No. | Cable Connection Description                                                                                                                                              |
|--------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Signal cable | 12  | Method 1: Use DO dry contacts to directly drive the SG Ready heat pump. The max. capability of the DO dry contacts is 12 V DC@1 A.                                        |
|              |     | Method 2: Use a 12 V@30 mA power supply to drive the external relay. Choose the proper contact capability of the external relay according to the SG Ready heat pump port. |

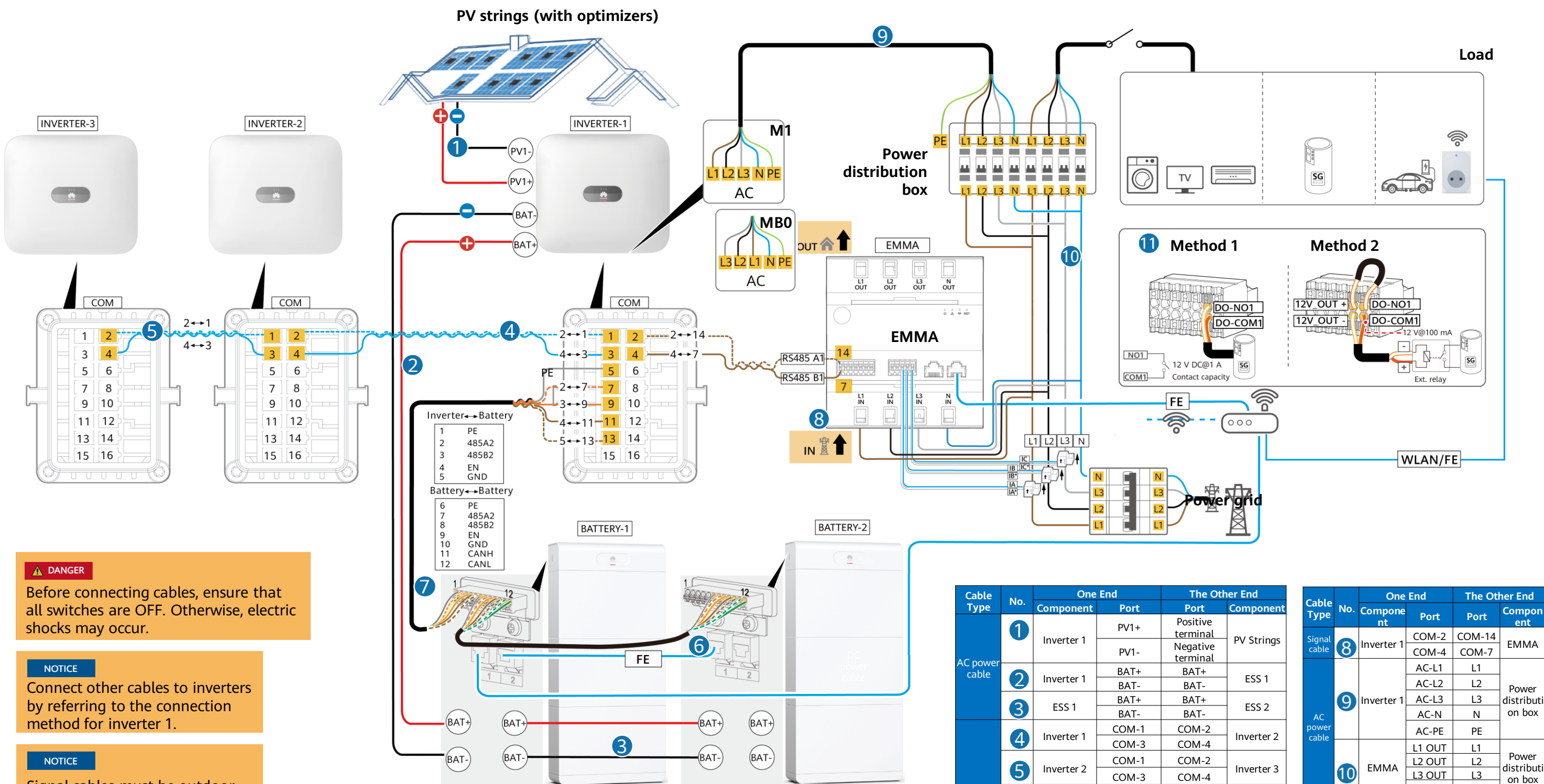
# Residential Smart PV Solution Quick Guide

(Three-Phase PV+ESS Scenario + EMMA Networking)



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## Cable Connections (Three-Phase Inverter M1/MB0 + ESS S1 + EMMA with an Internal CT)



**⚠ DANGER**  
Before connecting cables, ensure that all switches are OFF. Otherwise, electric shocks may occur.

**NOTICE**  
Connect other cables to inverters by referring to the connection method for inverter 1.

**NOTICE**  
Signal cables must be outdoor shielded twisted pair cables.

| Cable Type     | No. | One End    |                      | The Other End        |            |
|----------------|-----|------------|----------------------|----------------------|------------|
|                |     | Component  | Port                 | Port                 | Component  |
| AC power cable | 1   | Inverter 1 | PV1+                 | Positive terminal    | PV Strings |
|                |     |            | PV1-                 | Negative terminal    |            |
|                | 2   | Inverter 1 | BAT+                 | BAT+                 | ESS 1      |
|                |     |            | BAT-                 | BAT-                 |            |
|                | 3   | ESS 1      | BAT+                 | BAT+                 | ESS 2      |
| Signal cable   | 4   | Inverter 1 | COM-1                | COM-2                | Inverter 2 |
|                |     |            | COM-3                | COM-4                |            |
|                | 5   | Inverter 2 | COM-1                | COM-2                |            |
|                |     |            | COM-3                | COM-4                | Inverter 3 |
|                |     |            | COM-7                | COM-7                |            |
|                |     |            | COM-8                | COM-8                |            |
|                |     |            | COM-9                | COM-9                |            |
|                | 6   | ESS 1      | COM-10               | COM-10               | ESS 2      |
|                |     |            | COM-11               | COM-11               |            |
|                |     |            | COM-12               | COM-12               |            |
|                | 7   | Inverter 1 | COM-13               | COM-5                | ESS 1      |
|                |     |            | COM-11               | COM-4                |            |
|                |     |            | COM-7                | COM-2                |            |
|                |     |            | COM-9                | COM-3                |            |
|                |     |            | COM-5 (shield layer) | COM-6 (shield layer) |            |

| Cable Type                   | No. | One End                                                                                                                                                                   |        | The Other End |                           |
|------------------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------|---------------------------|
|                              |     | Component                                                                                                                                                                 | Port   | Port          | Component                 |
| Signal cable                 | 8   | Inverter 1                                                                                                                                                                | COM-2  | COM-14        | EMMA                      |
|                              |     |                                                                                                                                                                           | COM-4  | COM-7         |                           |
|                              | 9   | Inverter 1                                                                                                                                                                | AC-L1  | L1            | Power distribution on box |
|                              |     |                                                                                                                                                                           | AC-L2  | L2            |                           |
|                              |     |                                                                                                                                                                           | AC-L3  | L3            |                           |
|                              | 10  | EMMA                                                                                                                                                                      | AC-N   | N             | Power distribution on box |
|                              |     |                                                                                                                                                                           | AC-PE  | PE            |                           |
|                              |     |                                                                                                                                                                           | L1 OUT | L1            |                           |
|                              |     |                                                                                                                                                                           | L2 OUT | L2            |                           |
|                              |     |                                                                                                                                                                           | L3 OUT | L3            |                           |
|                              |     |                                                                                                                                                                           | N OUT  | N             |                           |
| Cable Connection Description |     |                                                                                                                                                                           |        |               |                           |
| Signal cable                 | 11  | Method 1: Use DO dry contacts to directly drive the SG Ready heat pump. The max. capability of the DO dry contacts is 12 V DC@1 A.                                        |        |               |                           |
|                              |     | Method 2: Use a 12 V@30 mA power supply to drive the external relay. Choose the proper contact capability of the external relay according to the SG Ready heat pump port. |        |               |                           |

# Residential Smart PV Solution Quick Guide

(Three-Phase PV+ESS Scenario + EMMA Networking)

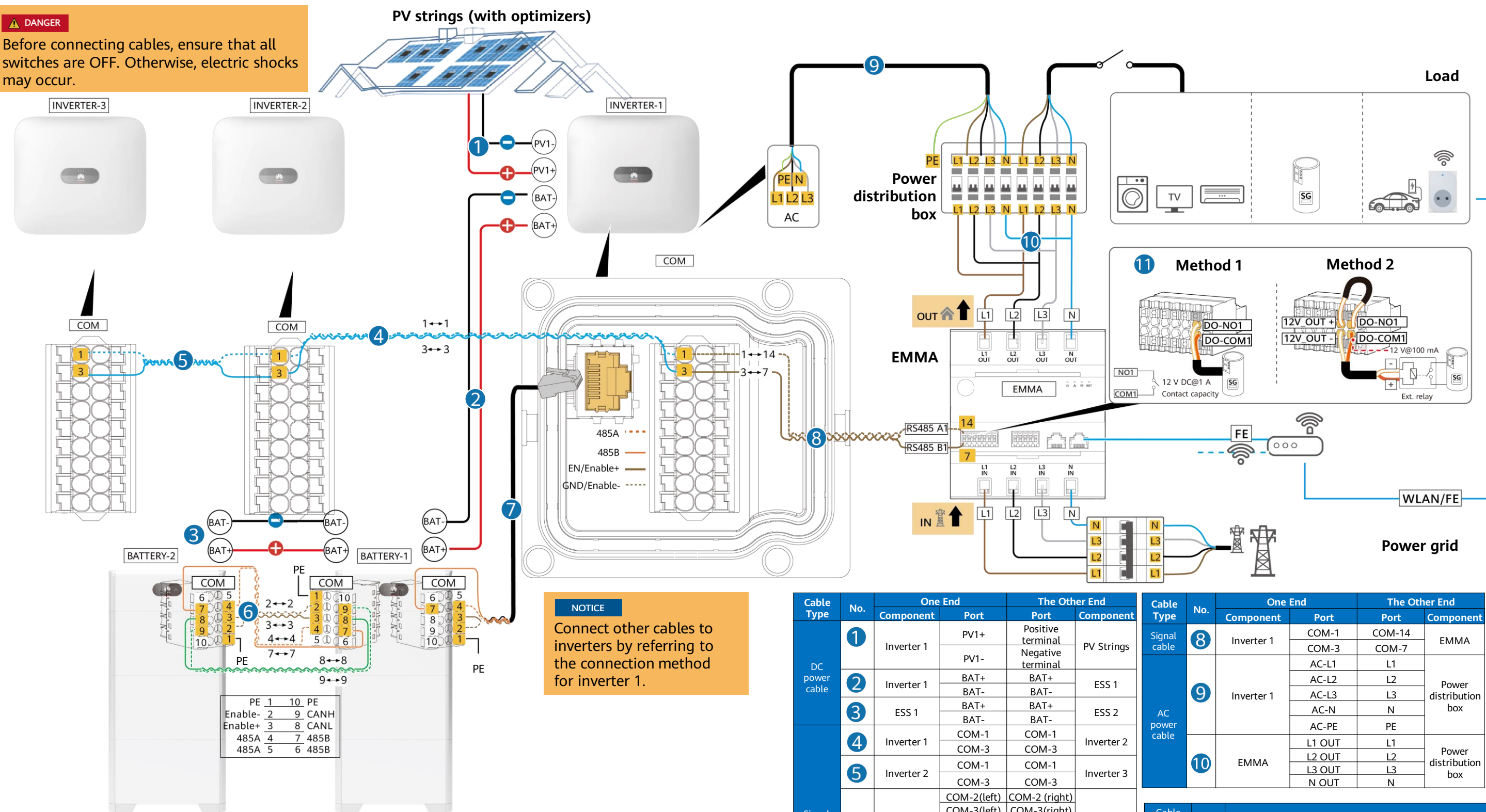


3

## Cable Connections (Three-Phase Inverter MAP0 + ESS S0 + EMMA with an Internal CT)

**DANGER**

Before connecting cables, ensure that all switches are OFF. Otherwise, electric shocks may occur.



**NOTICE**

Signal cables must be outdoor shielded twisted pair cables.

| Cable Type     | No. | One End    |                        | The Other End     |            |
|----------------|-----|------------|------------------------|-------------------|------------|
|                |     | Component  | Port                   | Port              | Component  |
| DC power cable | 1   | Inverter 1 | PV1+                   | Positive terminal | PV Strings |
|                |     |            | PV1-                   | Negative terminal |            |
|                | 2   | Inverter 1 | BAT+                   | BAT+              | ESS 1      |
|                | 3   | ESS 1      | BAT+                   | BAT+              | ESS 2      |
|                |     |            | BAT-                   | BAT-              |            |
|                | 4   | Inverter 1 | COM-1                  | COM-1             | Inverter 2 |
|                |     |            | COM-3                  | COM-3             |            |
|                | 5   | Inverter 2 | COM-1                  | COM-1             | Inverter 3 |
|                |     |            | COM-3                  | COM-3             |            |
|                | 6   | ESS 1      | COM-2(left)            | COM-2(right)      | ESS 2      |
|                |     |            | COM-3(left)            | COM-3(right)      |            |
|                |     |            | COM-4(left)            | COM-4(right)      |            |
|                |     |            | COM-7(left)            | COM-7(right)      | ESS 2      |
|                |     |            | COM-8(left)            | COM-8(right)      |            |
|                |     |            | COM-9(left)            | COM-9(right)      |            |
|                | 7   | Inverter 1 | COM: RJ45 network port | COM-2(right)      | ESS 1      |
|                |     |            |                        | COM-3(right)      |            |
|                |     |            |                        | COM-4(right)      |            |

| Cable Type     | No. | One End    |        | The Other End |                        |
|----------------|-----|------------|--------|---------------|------------------------|
|                |     | Component  | Port   | Port          | Component              |
| Signal cable   | 8   | Inverter 1 | COM-1  | COM-14        | EMMA                   |
|                |     |            | COM-3  | COM-7         |                        |
| AC power cable | 9   | Inverter 1 | AC-L1  | L1            | Power distribution box |
|                |     |            | AC-L2  | L2            |                        |
|                |     |            | AC-L3  | L3            |                        |
|                | 10  | EMMA       | AC-N   | N             | Power distribution box |
|                |     |            | AC-PE  | PE            |                        |
|                |     |            | L1 OUT | L1            |                        |

| Cable Type   | No. | Cable Connection Description                                                                                                                                                                                                                                                                                    |  |
|--------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Signal cable | 11  | Method 1: Use DO dry contacts to directly drive the SG Ready heat pump. The max. capability of the DO dry contacts is 12 V DC@1 A.<br>Method 2: Use a 12 V@30 mA power supply to drive the external relay. Choose the proper contact capability of the external relay according to the SG Ready heat pump port. |  |



# 3



# Residential Smart PV Solution Quick Guide

(Three-Phase PV+ESS Scenario + EMMA Networking)



## 4 System Commissioning

### App-based Deployment Procedure

- Download and install the FusionSolar app
- Sign up as an installer (optional, required for initial registration)
- Enter the setup wizard
- Check the device status

### Downloading and Installing the FusionSolar App

- Search for **FusionSolar** in the app store to download the app.
- Scan the QR code below to download the app.

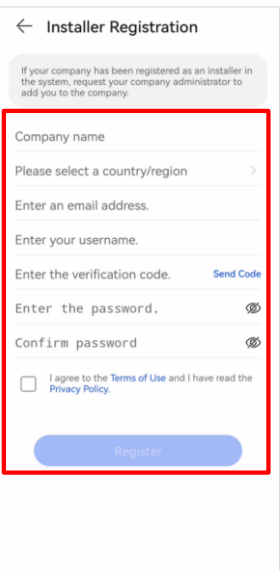
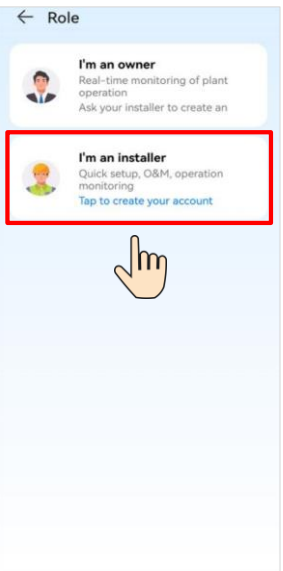
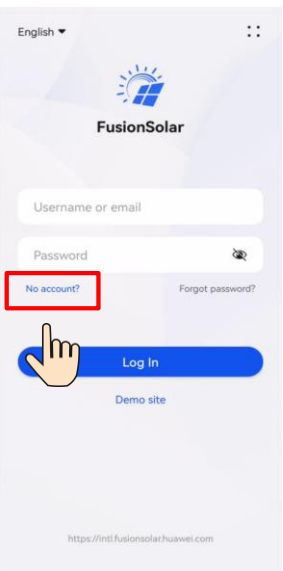


FusionSolar

### Installer Registration

#### Initial registration

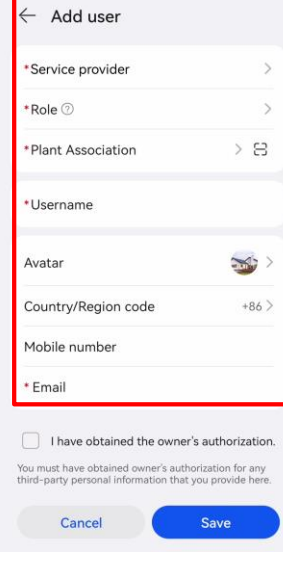
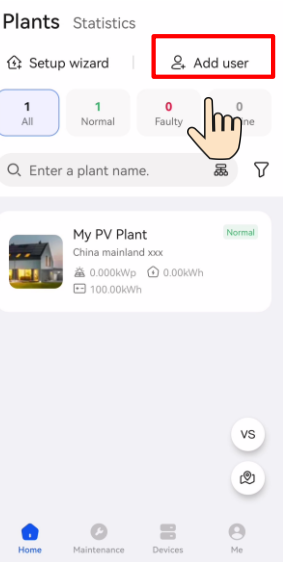
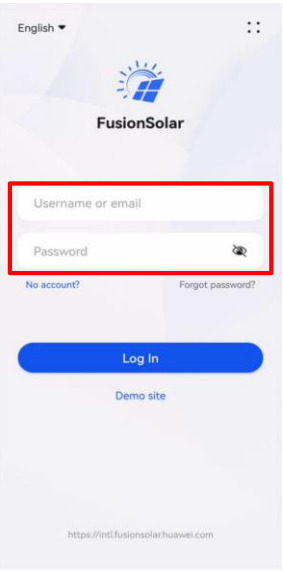
Create the first installer account, and generate a domain named after the company.



Or

#### Non-initial registration

If the company requires multiple installer accounts, log in to the FusionSolar app and tap **Add user** to create another installer account.

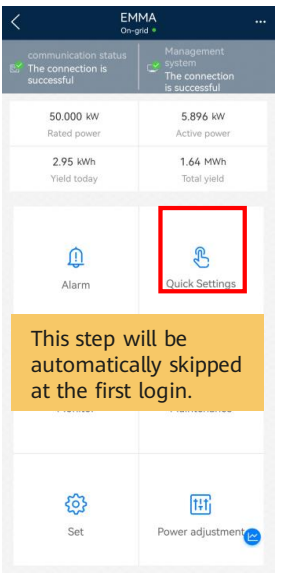
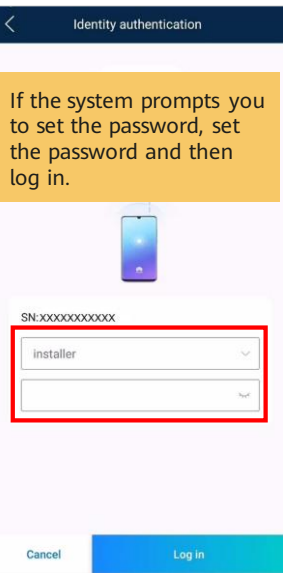
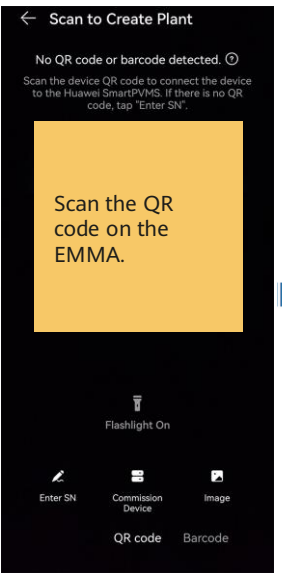
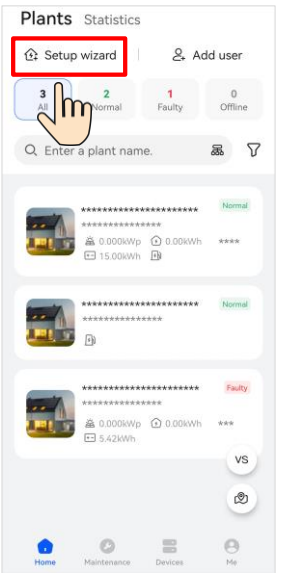


### Setup Wizard (Connecting to the EMMA WLAN for Commissioning)

#### Set the WLAN information of the charger.

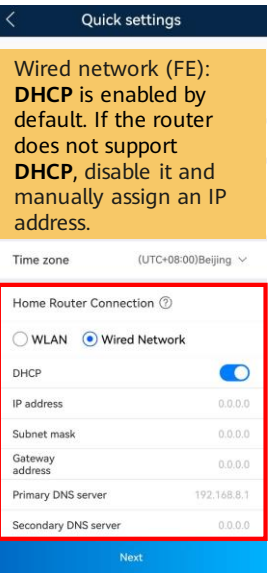


If the charger connects to the router through WLAN, you need to log in to the charger to set the WLAN information before deploying the EMMA.



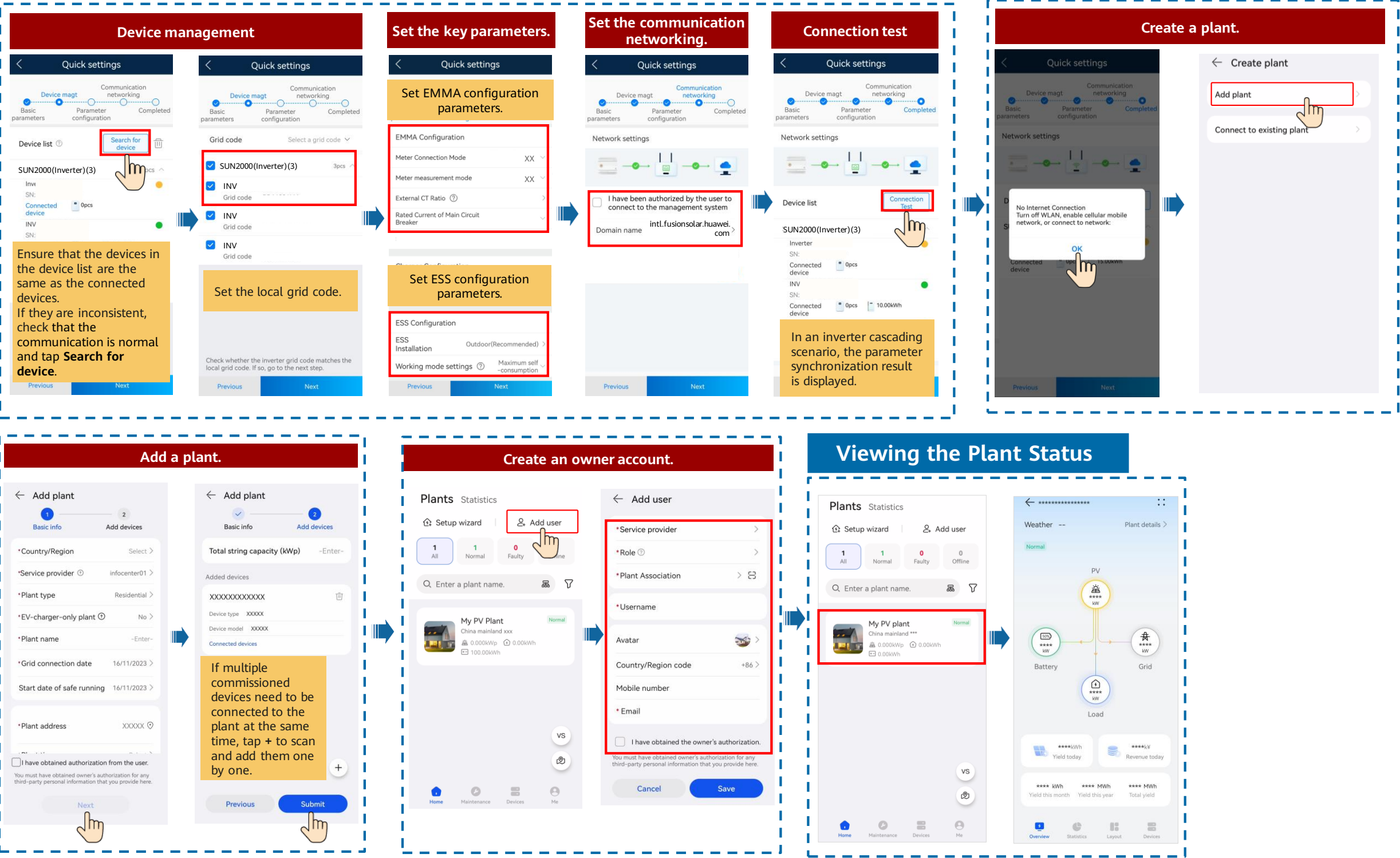
This step will be automatically skipped at the first login.

#### Set the router parameters.



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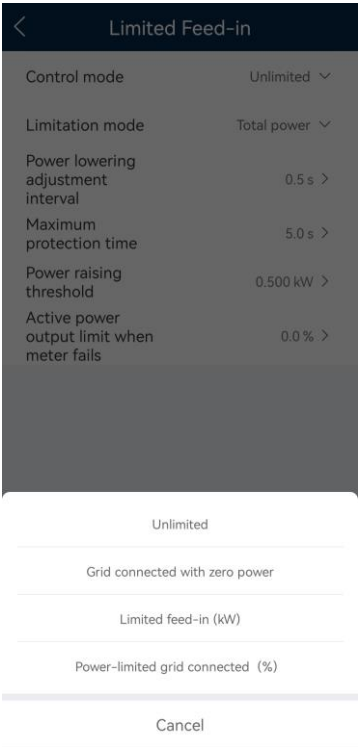
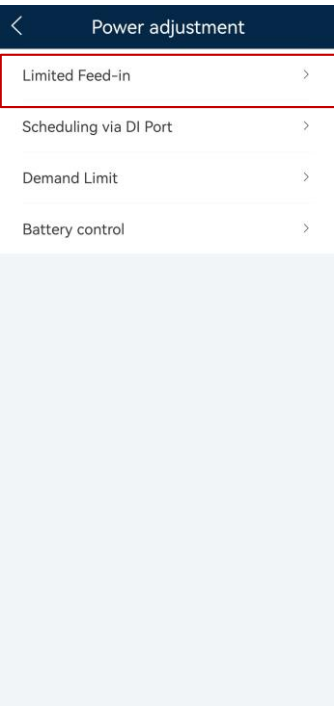
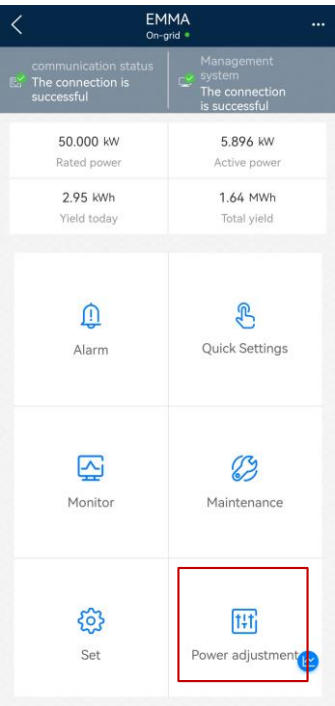
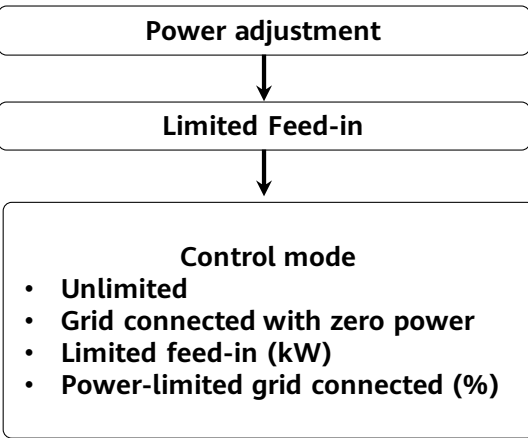
# Residential Smart PV Solution Quick Guide

(Three-Phase PV+ESS Scenario + EMMA Networking)



## 5 Grid-tied Point Parameters

### Setting Grid-tied Point Control



# Residential Smart PV Solution Quick Guide

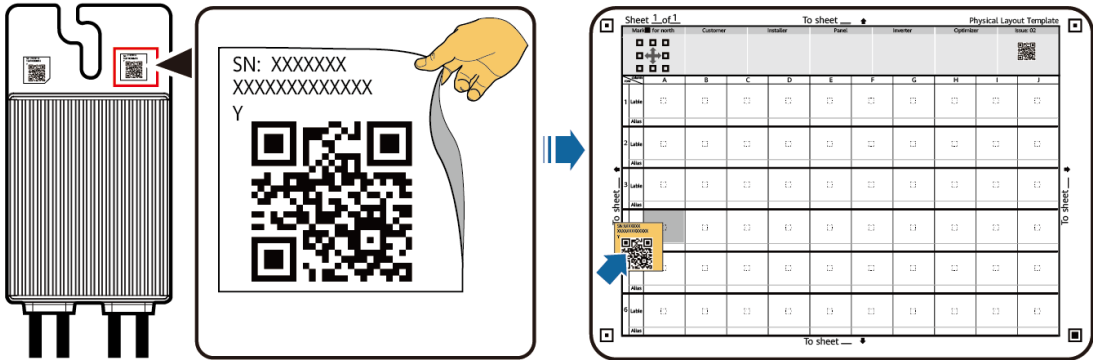
(Three-Phase PV+ESS Scenario + EMMA Networking)



## 6 Physical Layout of Smart PV Optimizers

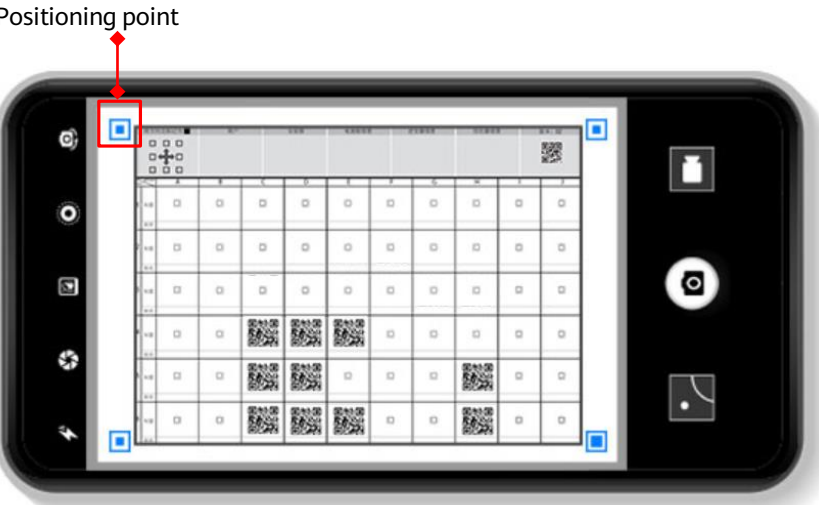
### Attaching SN Labels

Remove the SN labels from optimizers and attach them to the physical layout template based on the actual positions of the optimizers in the plant.



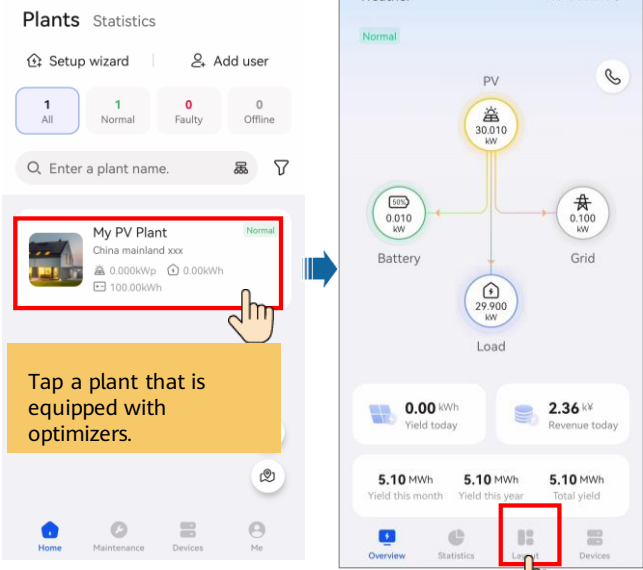
### Taking a Photo of the Physical Layout Template

Ensure that the four positioning points on the template are within the frame.



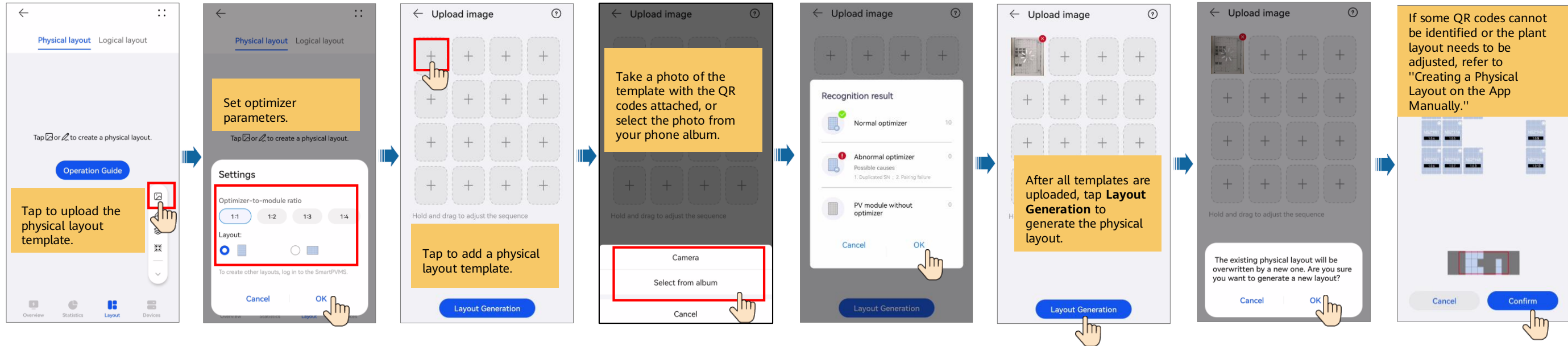
### Generating a Physical Layout on the App

Enter the Layout screen.



### Generating a Physical Layout on the App Automatically

Upload the template and generate a layout.



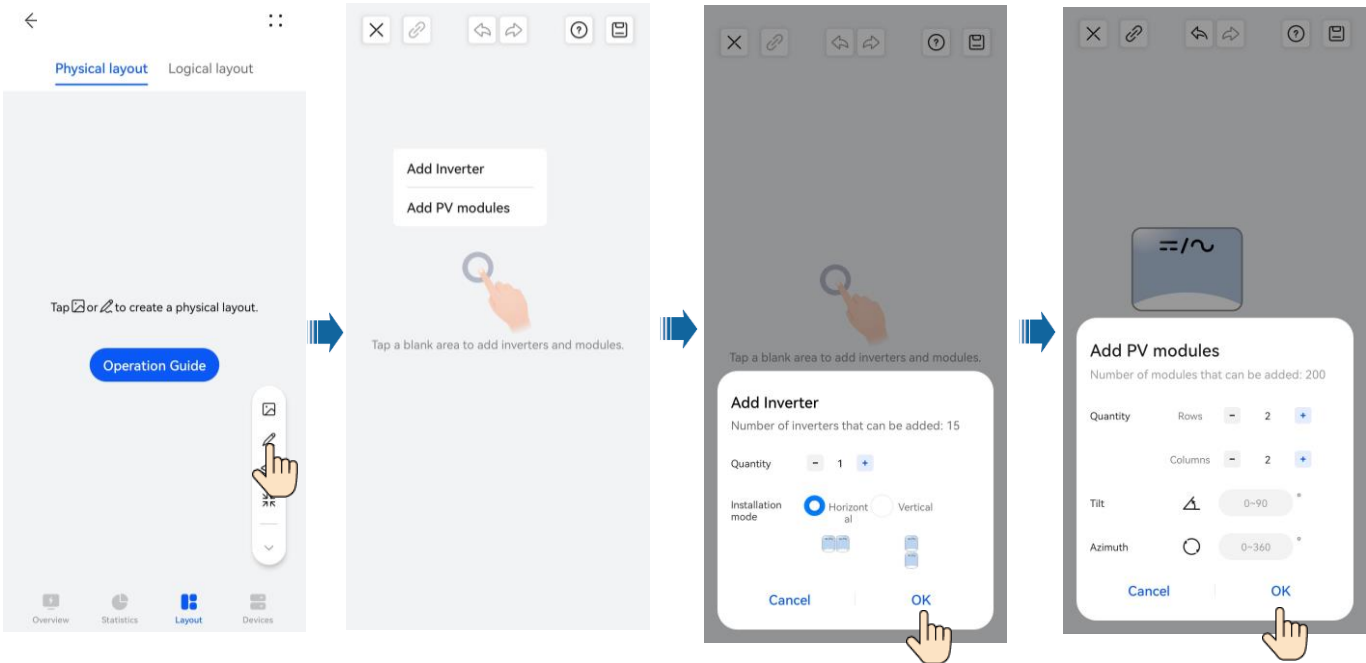
# Residential Smart PV Solution Quick Guide

(Three-Phase PV+ESS Scenario + EMMA Networking)

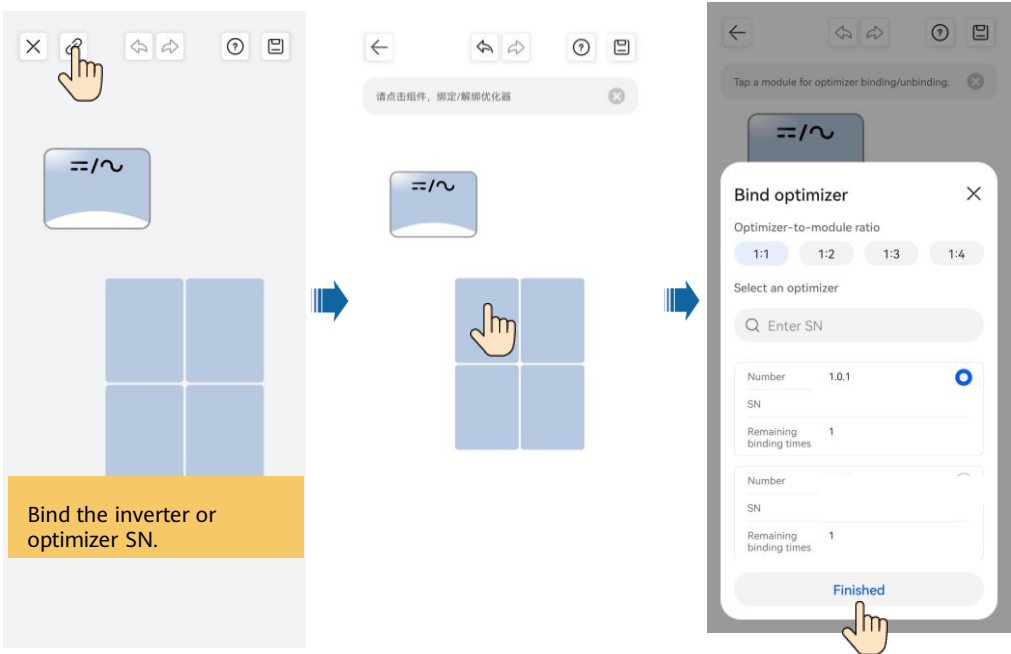


## Creating a Physical Layout on the App Manually

Edit the physical layout and specify the quantity of inverters and PV modules as required.



Bind the inverter or optimizer SN.



Adjust the physical layout.

