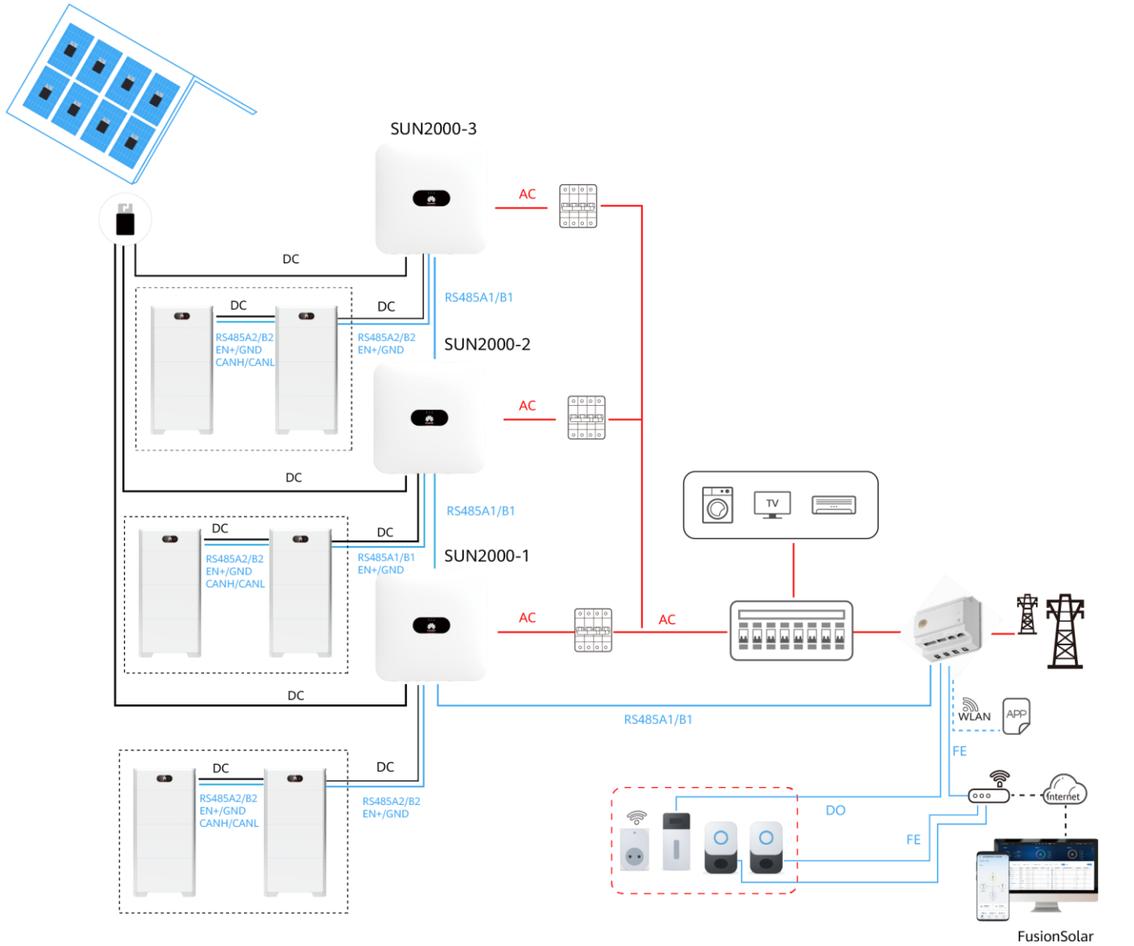
Residential Smart PV Solution Quick Guide
(Three-Phase PV+ESS Scenario + EMMA Networking)

Issue: 04
Date: 2024-03-31

1 Networking



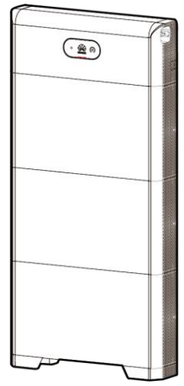
NOTE

1. 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.
2. For details about the solution components, installation, and cable connections, see the corresponding user manuals and quick guides.
3. The cable colors involved in this document are for reference only. Select cables in accordance with local cable specifications.

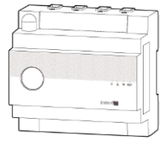
2 Product Overview

Inverter

ESS



EMMA



Smart PV Optimizer

Component	Model	Description
Inverter	SUN2000-(12KTL-25KTL)-MB0 series SUN2000-(3KTL-12KTL)-M1 SUN2000-(8KTL-20KTL)-M2 SUN2000-(12KTL-25KTL)-M5 series SUN2000-(5K-12K)-MAP0 series SUN5000-(8KTL, 12KTL)-MAP0 series SUN5000-(17K, 25K)-MB0 series	• A maximum of three inverters can be cascaded. • M1/M2/M5/MB0 inverters can be cascaded. • The SUN2000-(5K-12K)-MAP0 cannot be cascaded with other inverters. • SUN5000 inverters cannot be cascaded with SUN2000 inverters. • Optimizers must be configured for all PV modules connected to a SUN5000 inverter. Otherwise, the inverter cannot be started.
Energy storage system (ESS)	LUNA2000-(5-30)-S0 LUNA2000-(7, 14, 21)-S1	• Each M1/MP0 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) • The LUNA2000-(5-30)-S0 and LUNA2000-(7, 14, 21)-S1 cannot connect to the same inverter in a parallel system. • If inverters are cascaded, the LUNA2000-(5-30)-S0 and LUNA2000-(7, 14, 21)-S1 cannot connect to different inverters.
EMMA	EMMA-A01 EMMA-A02	• A01: Only PV and ESS features are supported. • A02: Features of PV, ESSs, smart chargers, and smart loads are supported.
Smart PV Optimizer	SUN2000-450W-P2 SUN2000-600W-P MERC-600W-PA0	• SUN2000-600W-P: Long and short input cables are available to connect to PV modules with different cable lengths. • The SUN2000-(600W-P, 450W-P2) and MERC-600W-PA0 cannot be used together for the same inverter.

NOTE

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

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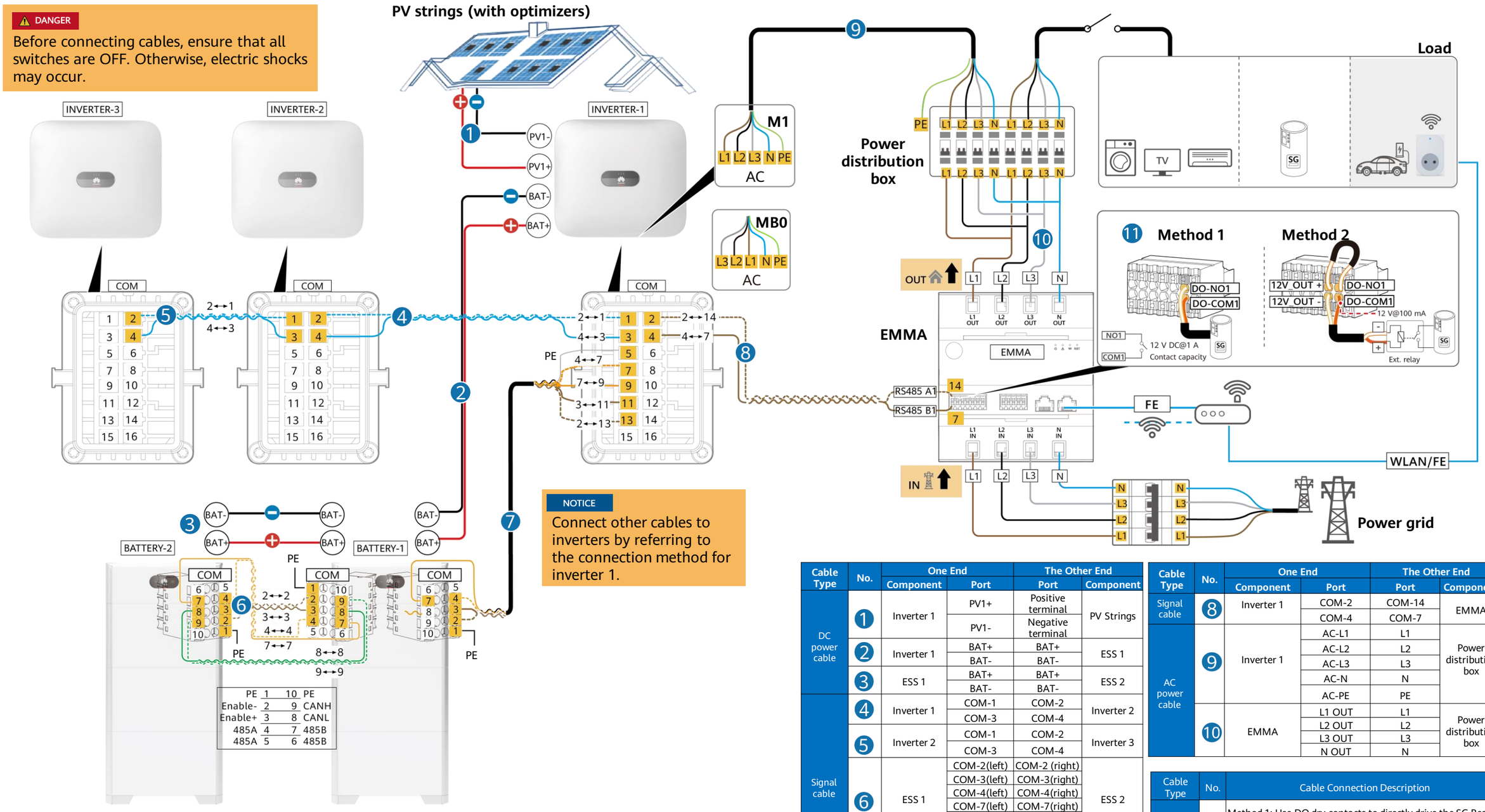
3 Cable Connections (Three-Phase Inverter M1/MB0 + ESS S0 + EMMA with an Internal CT)

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		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-	
	3	ESS 1	BAT+	BAT+	ESS 2
			BAT-	BAT-	
Signal cable	4	Inverter 1	COM-1	COM-2	Inverter 2
			COM-3	COM-4	
	5	Inverter 2	COM-1	COM-2	Inverter 3
			COM-3	COM-4	
	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)	
			COM-9(left)	COM-9(right)	
	7	Inverter 1	COM-13	COM-2(right)	ESS 1
			COM-11	COM-3(right)	
			COM-7	COM-4(right)	
			COM-9	COM-7(right)	
			COM-5 (shield layer)	COM-1 (right) (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	
AC power cable	9	Inverter 1	AC-L1	L1	Power distribution box
			AC-L2	L2	
			AC-L3	L3	
			AC-N	N	
			AC-PE	PE	
	10	EMMA	L1 OUT	L1	Power distribution box
			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. 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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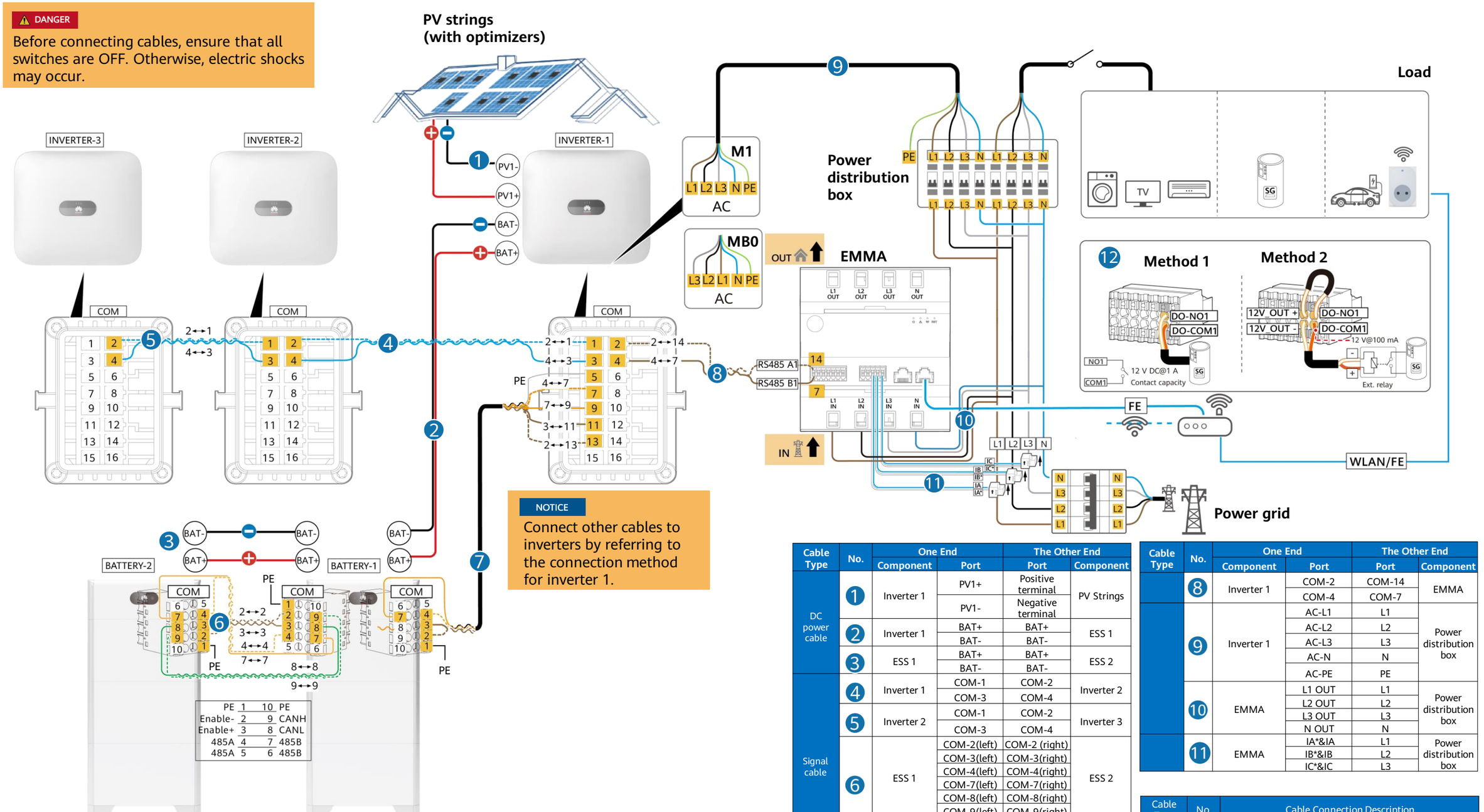

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Cable Type	No.	One End		The Other End	
		Component	Port	Port	Component
DC power cable	1	Inverter 1	PV1+	Positive terminal	PV Strings
			PV1-	Negative terminal	
	2	Inverter 1	BAT+	BAT+	ESS 1
			BAT-	BAT-	
	3	ESS 1	BAT+	BAT+	ESS 2
			BAT-	BAT-	
Signal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

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	
			AC-PE	PE	
	10	EMMA	L1 OUT	L1	Power distribution box
			L2 OUT	L2	
			L3 OUT	L3	
			N OUT	N	
	11	EMMA	IA*&IA	L1	Power distribution box
			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.

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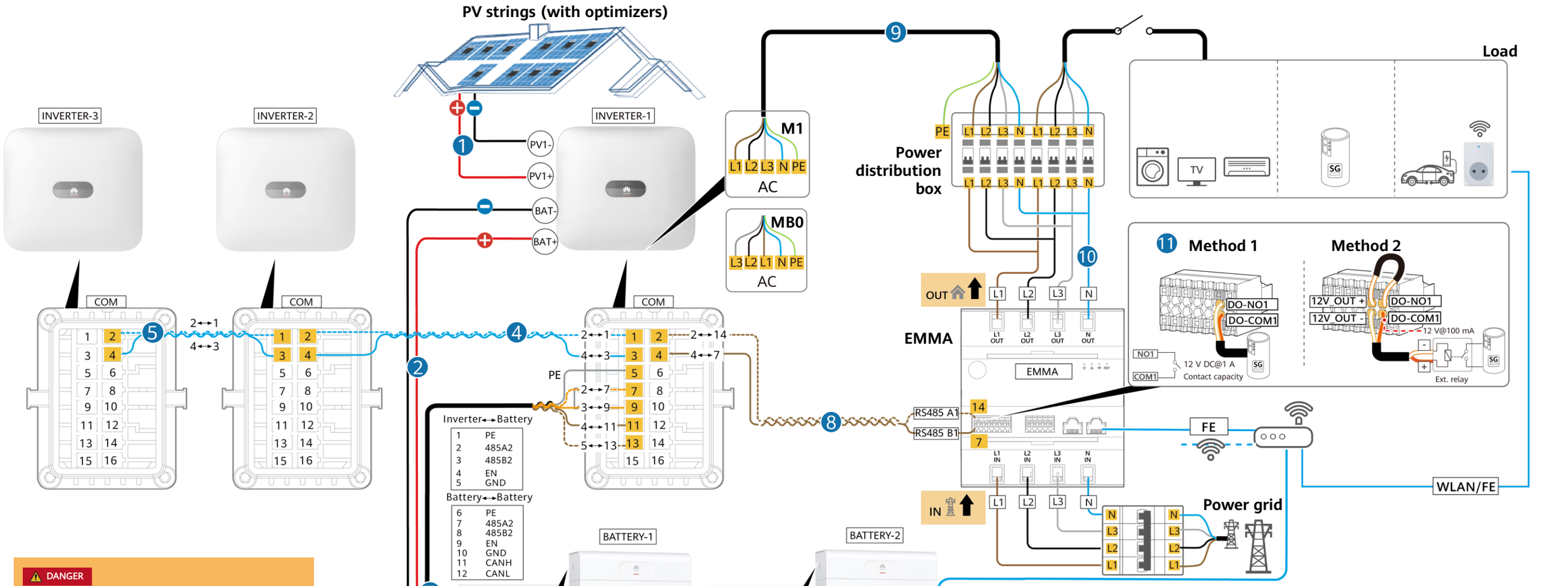

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Connect other cables to inverters by referring to the connection method for inverter 1.

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
			BAT-	BAT-	
Signal cable	4	Inverter 1	COM-1	COM-2	Inverter 2
			COM-3	COM-4	
	5	Inverter 2	COM-1	COM-2	Inverter 3
			COM-3	COM-4	
	6	ESS 1	COM-7	COM-7	ESS 2
			COM-8	COM-8	
			COM-9	COM-9	
			COM-10	COM-10	
			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	
AC power cable	9	Inverter 1	AC-L1	L1	Power distribution box
			AC-L2	L2	
			AC-L3	L3	
			AC-N	N	
			AC-PE	PE	
	10	EMMA	L1 OUT	L1	Power distribution box
			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. 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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3 Cable Connections (Three-Phase Inverter MAP0 + ESS S0 + EMMA with an Internal CT)

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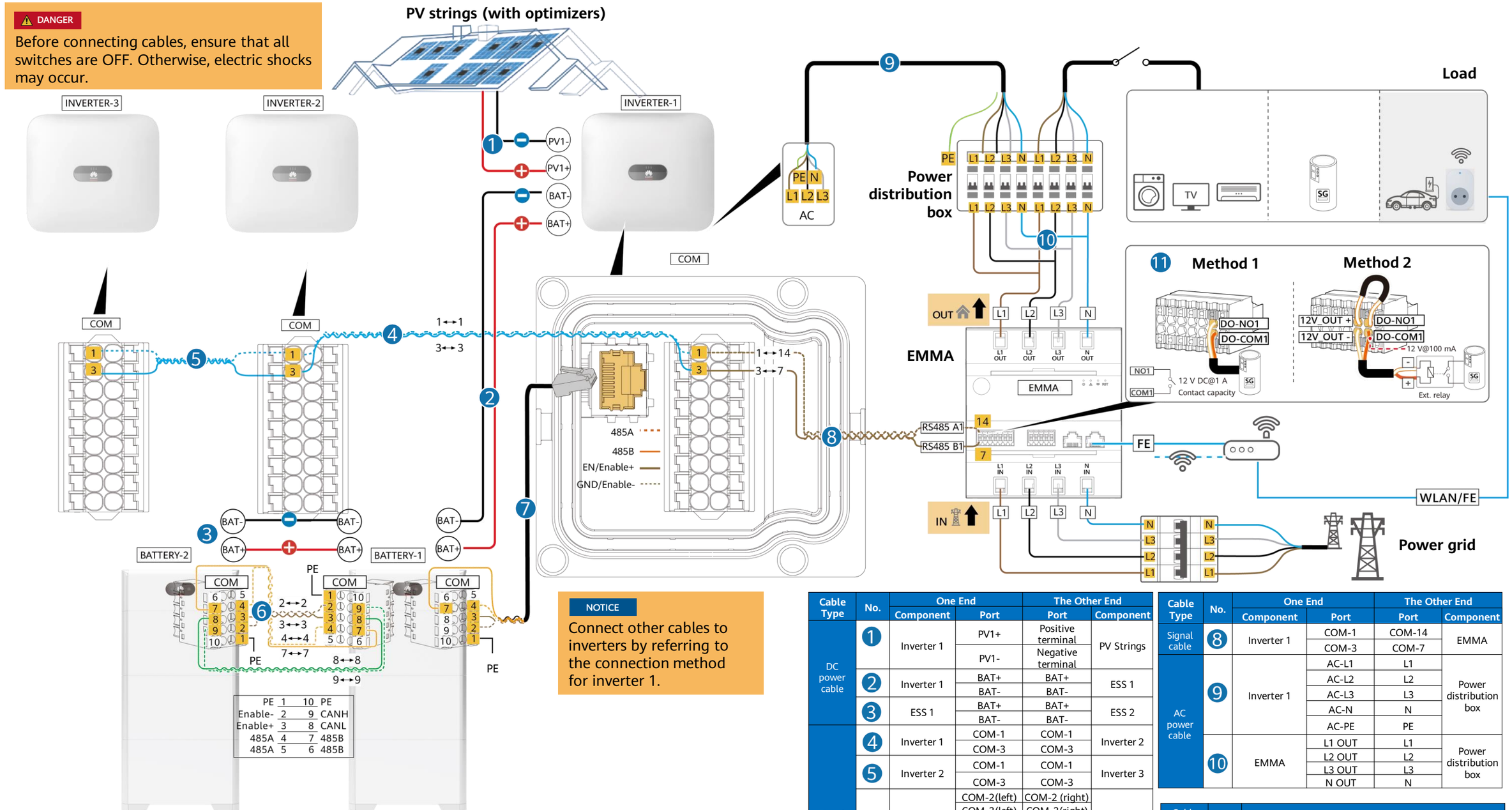

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			PV1-	Negative terminal	
	2	Inverter 1	BAT+	BAT+	ESS 1
			BAT-	BAT-	
	3	ESS 1	BAT+	BAT+	ESS 2
			BAT-	BAT-	
Signal cable	4	Inverter 1	COM-1	COM-1	Inverter 2
			COM-3	COM-3	
	5	Inverter 2	COM-1	COM-1	Inverter 3
			COM-3	COM-3	
	6	ESS 1	COM-2(left)	COM-2 (right)	ESS 2
			COM-3(left)	COM-3(right)	
			COM-4(left)	COM-4(right)	
			COM-7(left)	COM-7(right)	
			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)	
				COM-7(right)	

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		Component	Port	Port	Component
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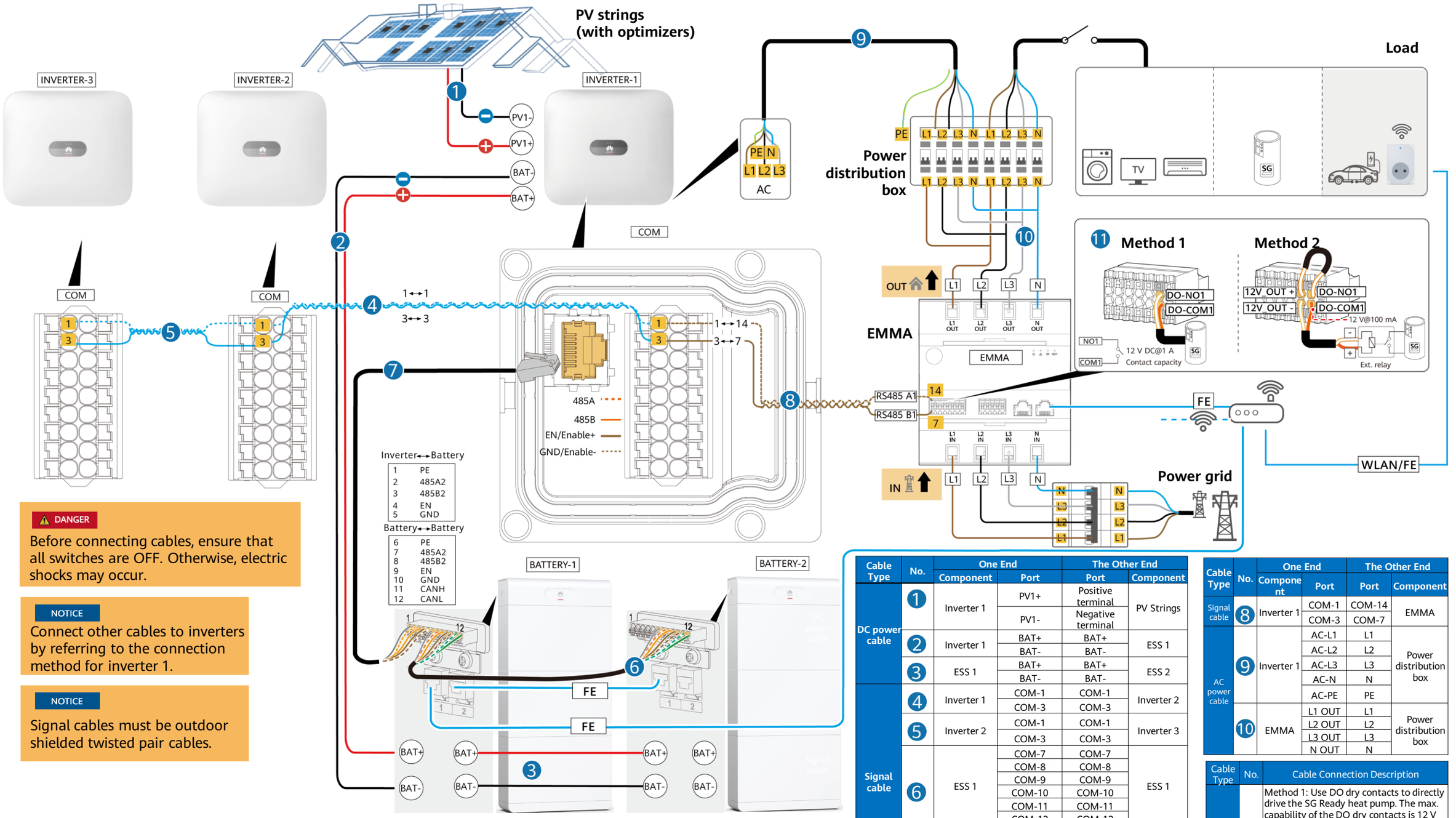

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			BAT-	BAT-	
	3	ESS 1	BAT+	BAT+	ESS 2
			BAT-	BAT-	
Signal cable	4	Inverter 1	COM-1	COM-1	Inverter 2
			COM-3	COM-3	
	5	Inverter 2	COM-1	COM-1	Inverter 3
			COM-3	COM-3	
	6	ESS 1	COM-7	COM-7	ESS 1
			COM-8	COM-8	
			COM-9	COM-9	
			COM-10	COM-10	
			COM-11	COM-11	
			COM-12	COM-12	
	7	Inverter 1	COM: RJ45 network port	COM-3	ESS 1
				COM-2	
				COM-5	
				COM-4	

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			COM-3	COM-7	
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			AC-L2	L2	
			AC-L3	L3	
			AC-N	N	
			AC-PE	PE	
	10	EMMA	L1 OUT	L1	Power distribution box
			L2 OUT	L2	
			L3 OUT	L3	
			N OUT	N	

Cable Type	No.	Cable Connection Description
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HUAWEI

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

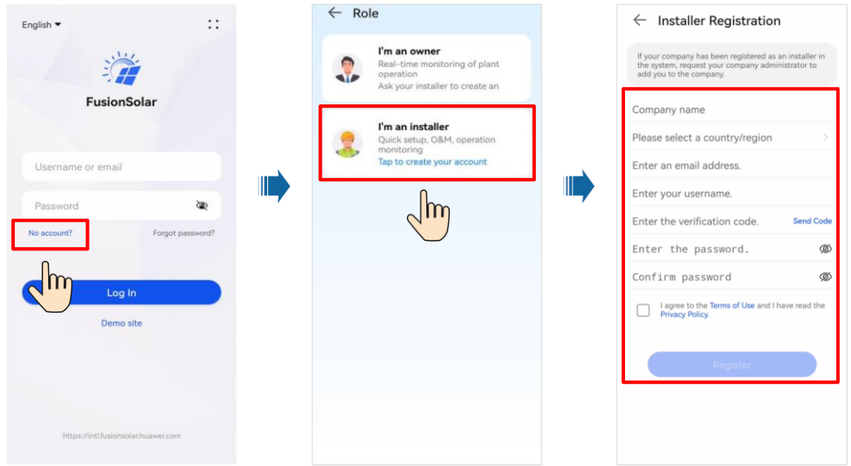
- Search for **FusionSolar** in the app store to download the app.
- Scan the QR code below to download the app.

FusionSolar

Installer Registration

Initial registration

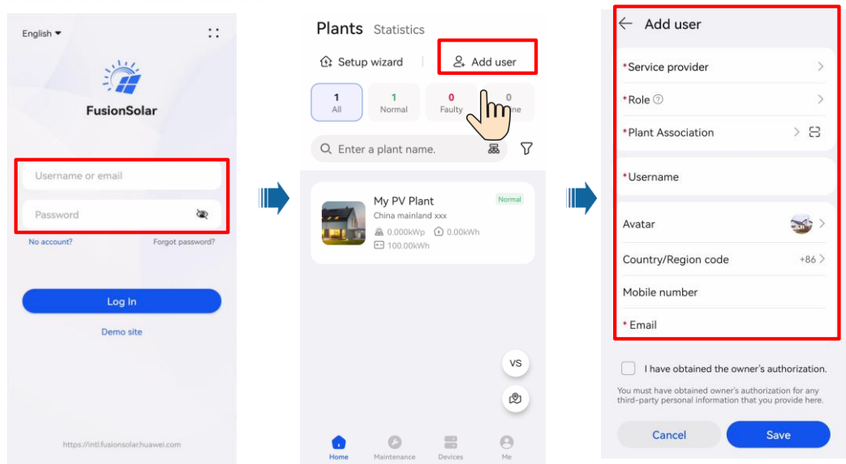
Create the first installer account, and generate a domain named after the company.



Or

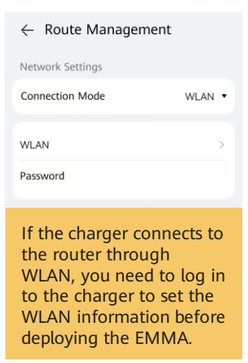
Non-initial registration

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

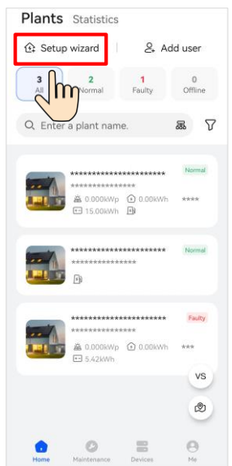


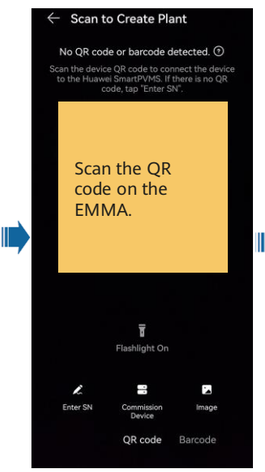
Setup Wizard (Connecting to the EMMA WLAN for Commissioning)

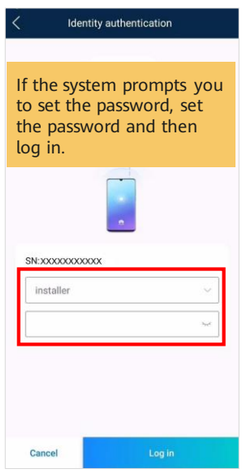
Set the WLAN information of the charger.

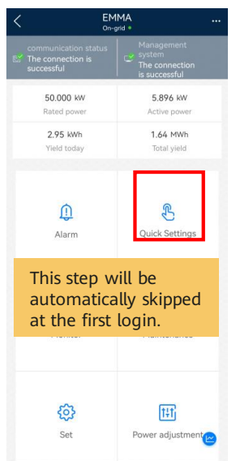


If the charger connects to the router through WLAN, you need to log in to the charger to set the WLAN information before deploying the EMMA.



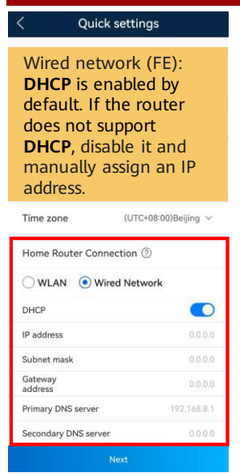




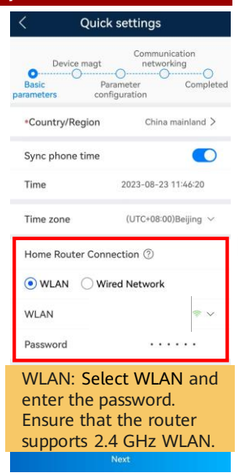


This step will be automatically skipped at the first login.

Set the router parameters.



Wired network (FE): **DHCP** is enabled by default. If the router does not support **DHCP**, disable it and manually assign an IP address.



WLAN: Select **WLAN** and enter the password. Ensure that the router supports 2.4 GHz WLAN.

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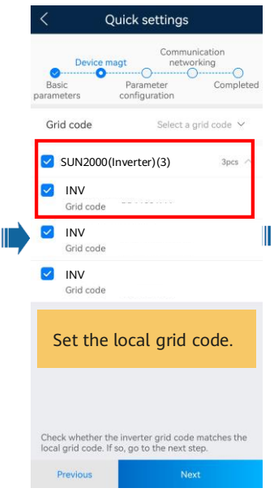
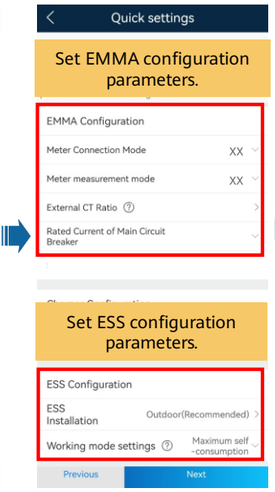
Device management

Ensure that the devices in the device list are the same as the connected devices.
If they are inconsistent, check that the communication is normal and tap **Search for device**.



Set the local grid code.

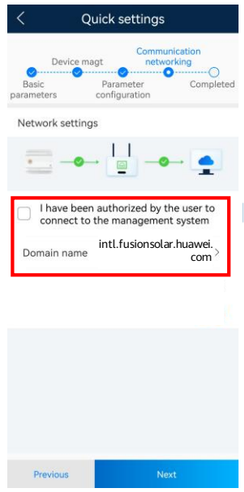
Set the key parameters.



Set EMMA configuration parameters.

Set ESS configuration parameters.

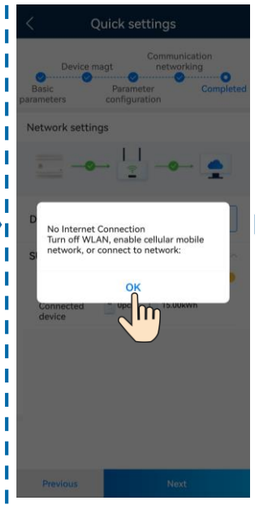
Set the communication networking.

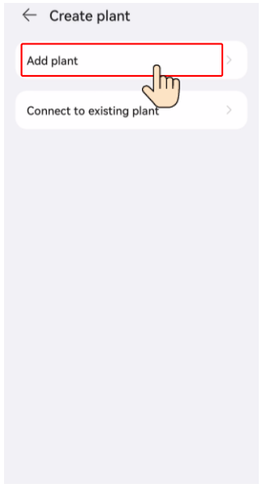


Connection test

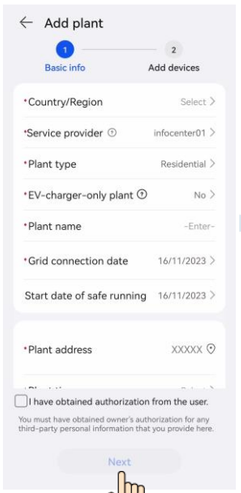
In an inverter cascading scenario, the parameter synchronization result is displayed.

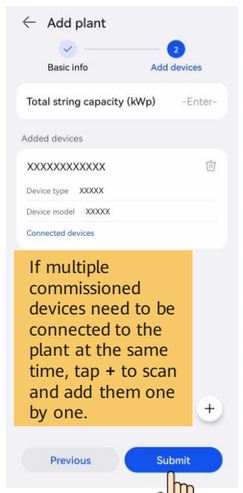
Create a plant.





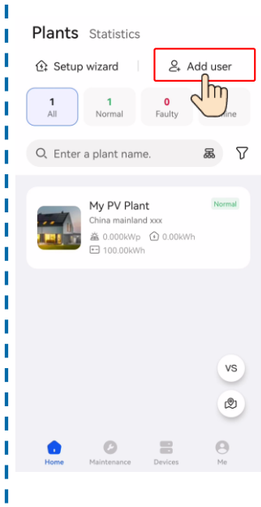
Add a plant.

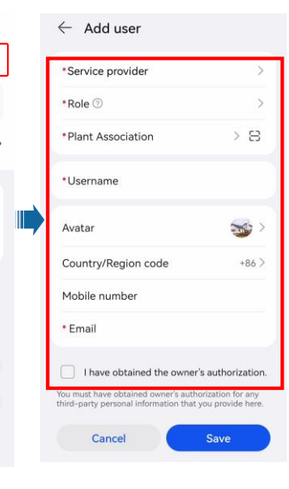




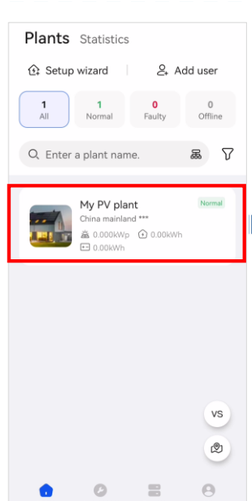
If multiple commissioned devices need to be connected to the plant at the same time, tap + to scan and add them one by one.

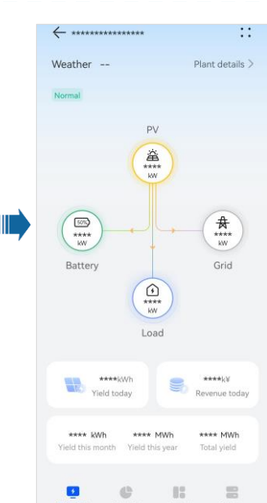
Create an owner account.





Viewing the Plant Status





Residential Smart PV Solution Quick Guide
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5 Grid-tied Point Parameters

Setting Grid-tied Point Control

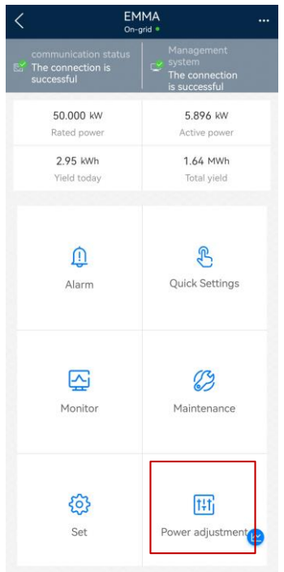
Power adjustment

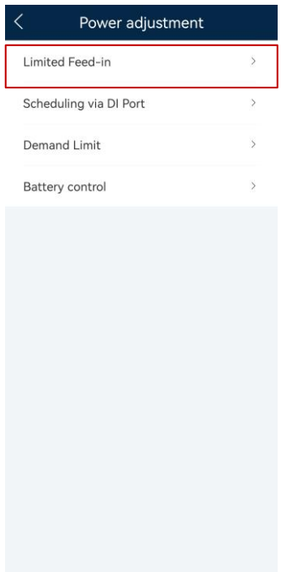
↓

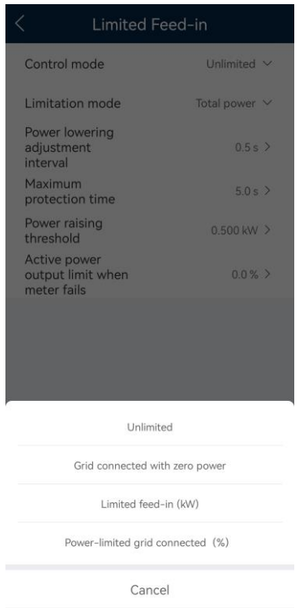
Limited Feed-in

↓

Control mode
- **Unlimited**
- **Grid connected with zero power**
- **Limited feed-in (kW)**
- **Power-limited grid connected (%)**







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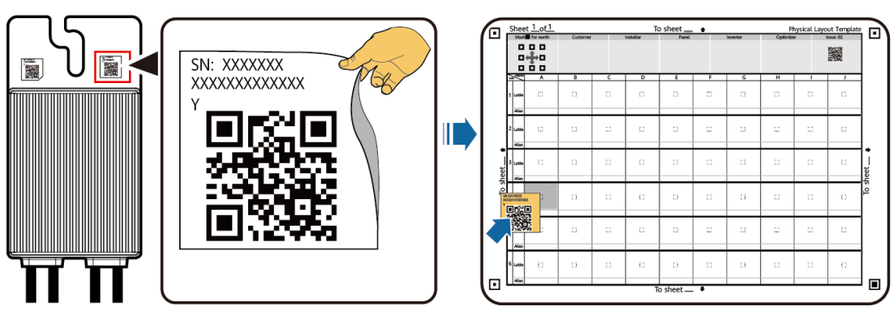
HUAWEI

6 Physical Layout of Smart PV Optimizers

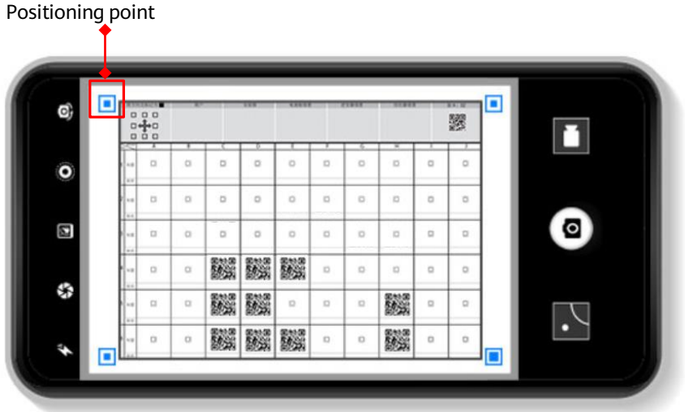
Attaching SN Labels

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.



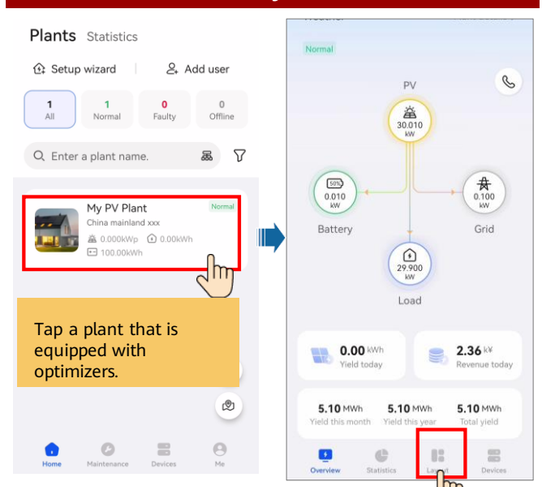
Taking a Photo of the Physical Layout Template

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



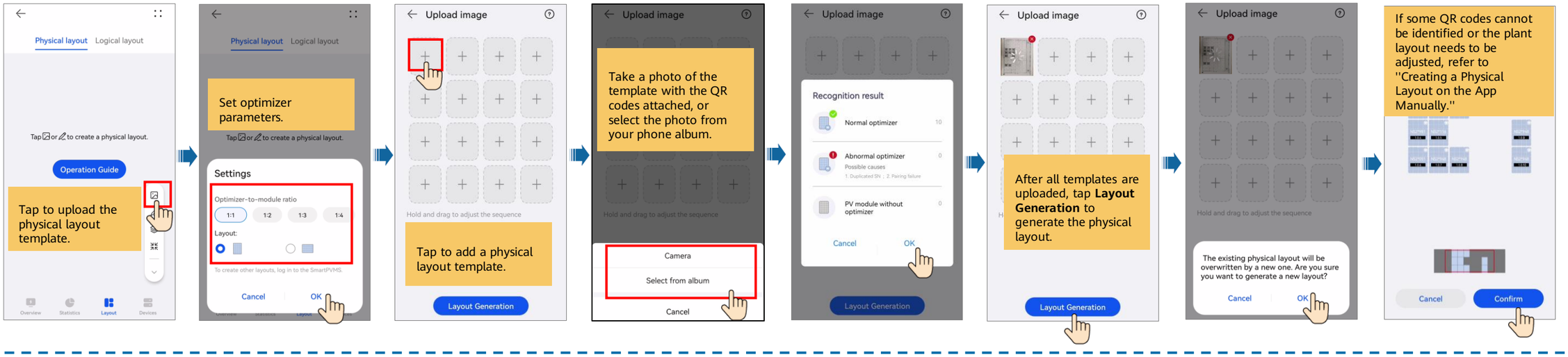
Generating a Physical Layout on the App

Enter the Layout screen.



Generating a Physical Layout on the App Automatically

Upload the template and generate a layout.



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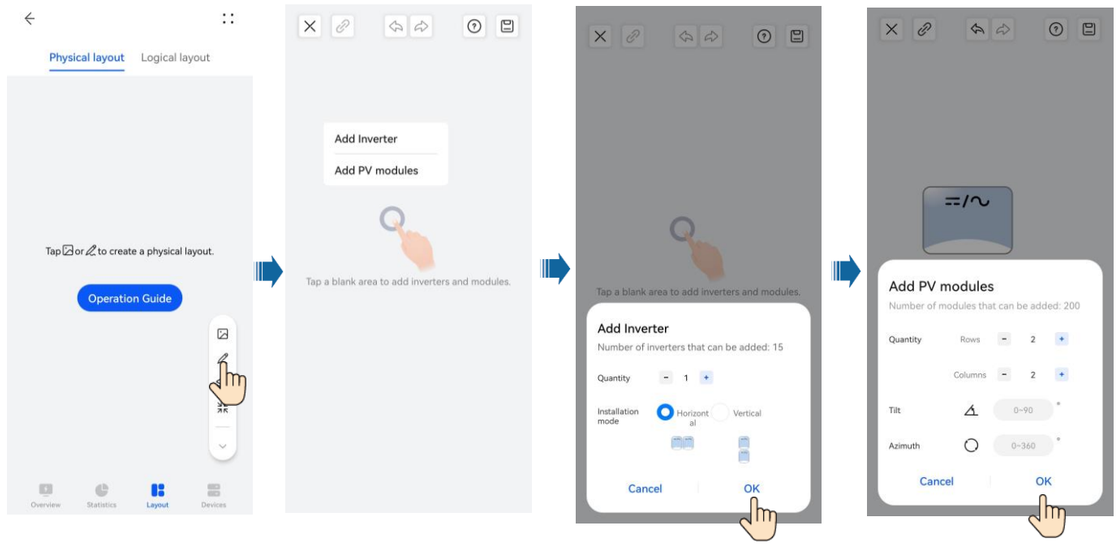
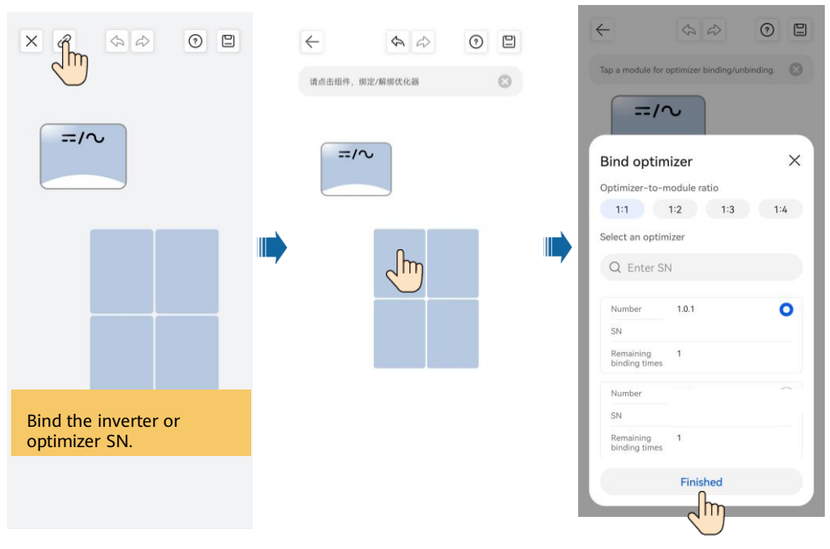
Creating a Physical Layout on the App Manually

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.