

# Residential Smart PV Solution Quick Guide

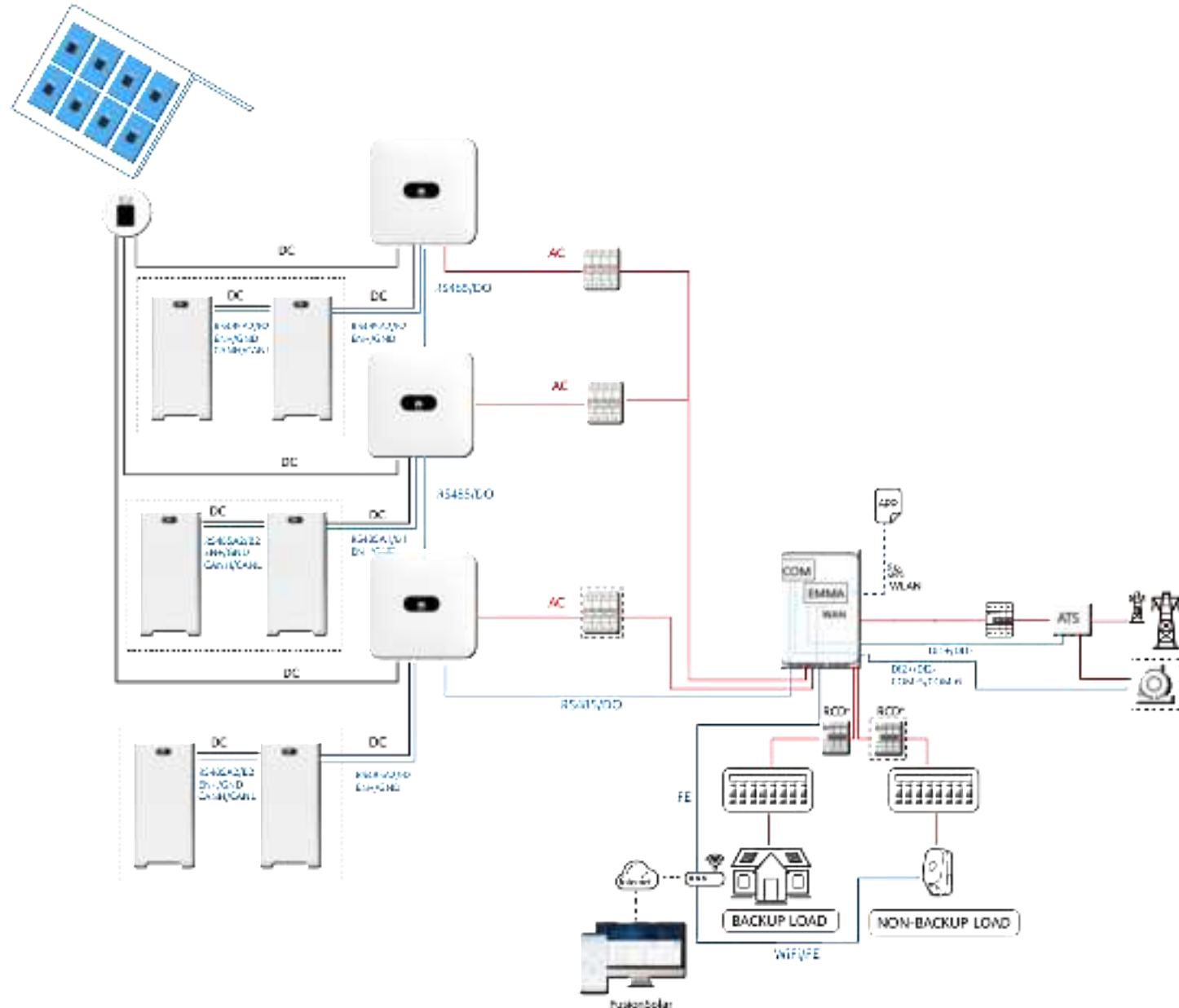
## (Three-Phase PV+ESS Scenario + SmartGuard Networking)

Issue: 02  
Date: 2024-07-15



### 1 Networking

Connecting All Loads to the SmartGuard



\* The figure uses the LUNA2000-(5-30)-S0 as an example.

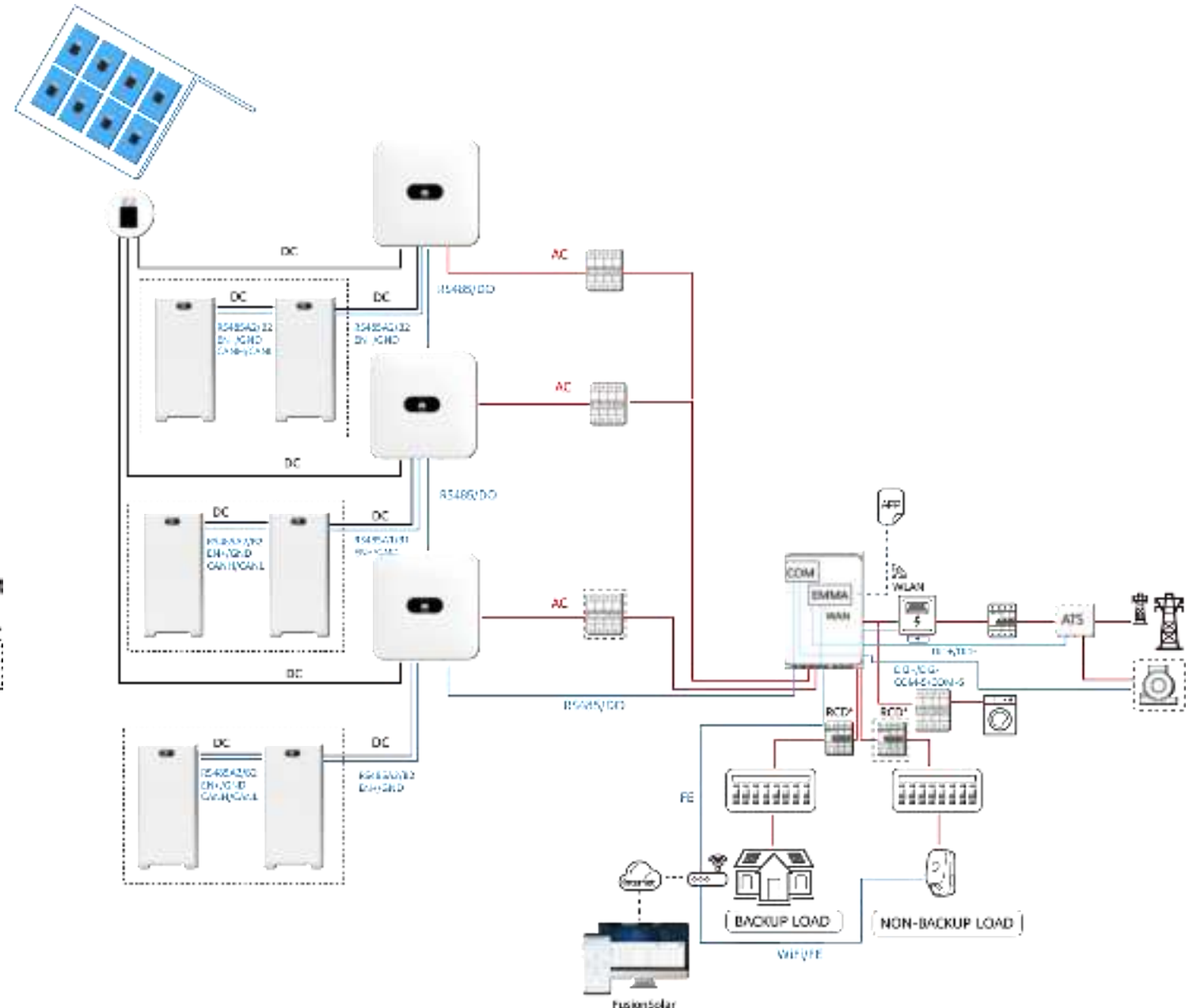
#### **DANGER**

- An RCD must be installed for the backup load. During off-grid operation, the main circuit breaker does not provide protection. Electric leakage on the loads may result in electric shocks.
- A main circuit breaker with the leakage protection function must be installed. Its rated residual operating current must be  $\geq \text{Number of M1 or MAP0 inverters} \times 100 \text{ mA}$  or  $\geq \text{Number of MB0 inverters} \times 300 \text{ mA}$ .

#### **NOTE**

- Both the EMMA in the SmartGuard and the 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.
- If a charger is configured, the charger must be installed on the non-backup load port.

Connecting Some of Loads to the SmartGuard



#### **NOTE**

The three-phase SmartGuard supports a maximum load current of 63 A. If the load current exceeds 63 A, only some of loads can be connected to it. In addition, a power meter needs to be connected between the three-phase SmartGuard and the main circuit breaker.

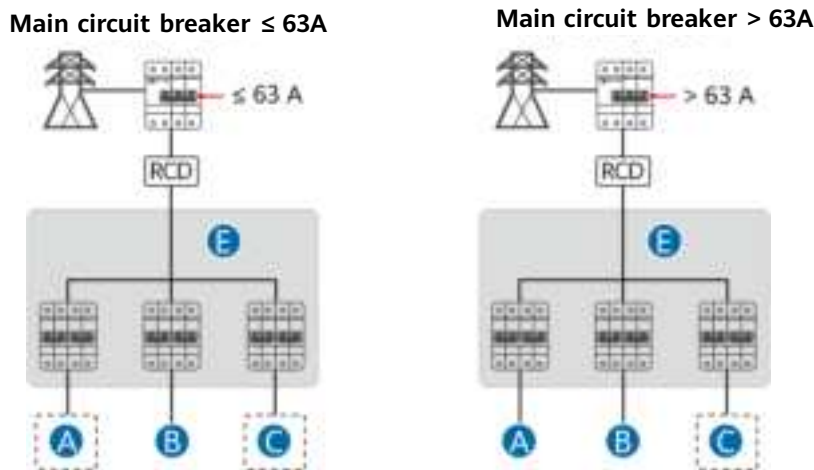
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## (Three-Phase PV+ESS Scenario + SmartGuard Networking)

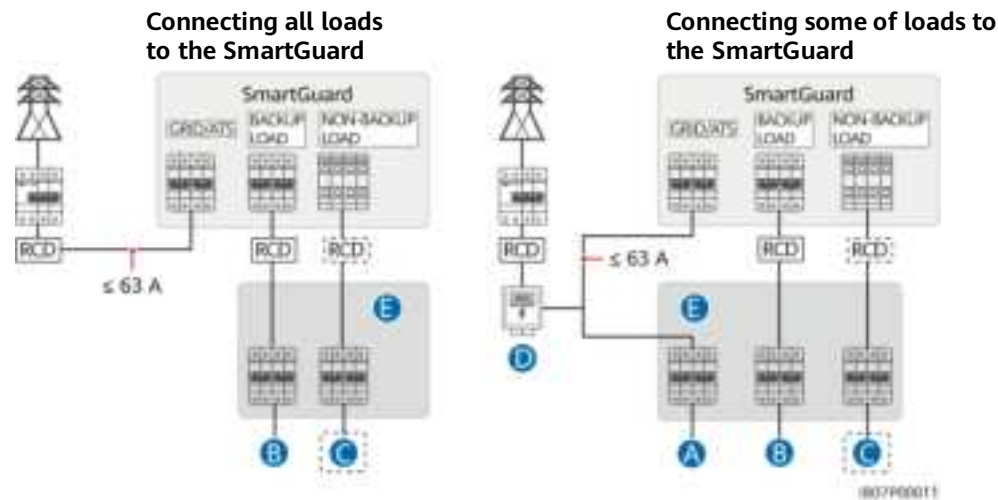


### 1 Networking

If the main circuit breaker's rating is 63 A or less, you can connect all or some of the loads to the SmartGuard. However, if the rating is greater than 63 A, you can connect only some of the loads to the SmartGuard. (Dashed boxes indicate optional components.)



Loads connected to the SmartGuard (dashed boxes indicate optional components)



(A) Load not connected to the SmartGuard (B) Backup load (C) Non-backup load (D) Power meter (E) AC power distribution box

### 2 Product Overview



Component	Model	Description
Inverter	SUN2000-(3KTL-10KTL)-M1 SUN2000-(12K-25K)-MB0 series SUN5000-(17K, 25K)-MB0 series SUN2000-(5K-12K)-MAP0 series SUN5000-(8K, 12K)-MAP0 series	<ul style="list-style-type: none"><li>M1/MB0: Only one inverter is supported.</li><li>MAP0: A maximum of three inverters are supported.</li><li>The SUN2000-(5K-12K)-MAP0 inverter 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 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>
SmartGuard	SmartGuard-63A-T0 SmartGuard-63A-AUT0	Works with the inverter, ESS, grid, and home appliances to achieve smart management on home power consumption, grid detection, and on/off-grid switchover.
Smart PV Optimizer	SUN2000-450W-P2 SUN2000-600W-P MERC-600W-PA0 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**

- 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.

# Residential Smart PV Solution Quick Guide

## (Three-Phase PV+ESS Scenario + SmartGuard Networking)



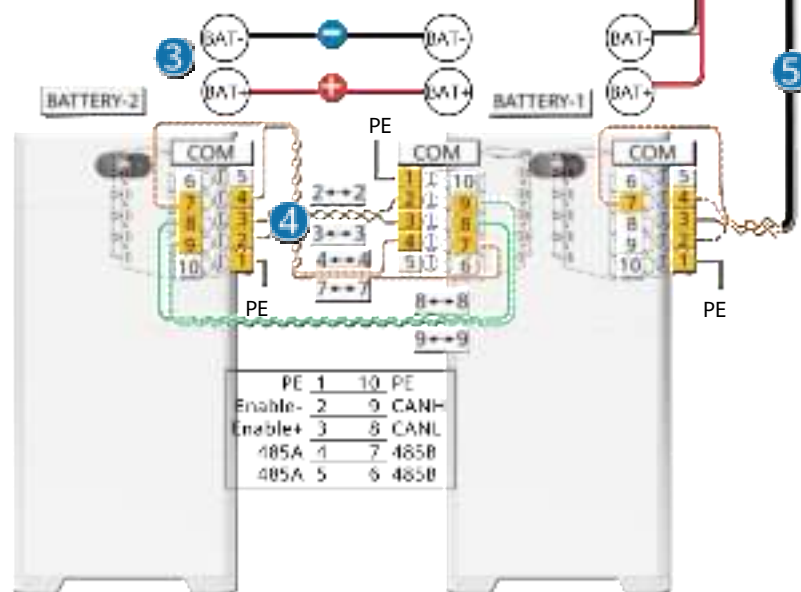
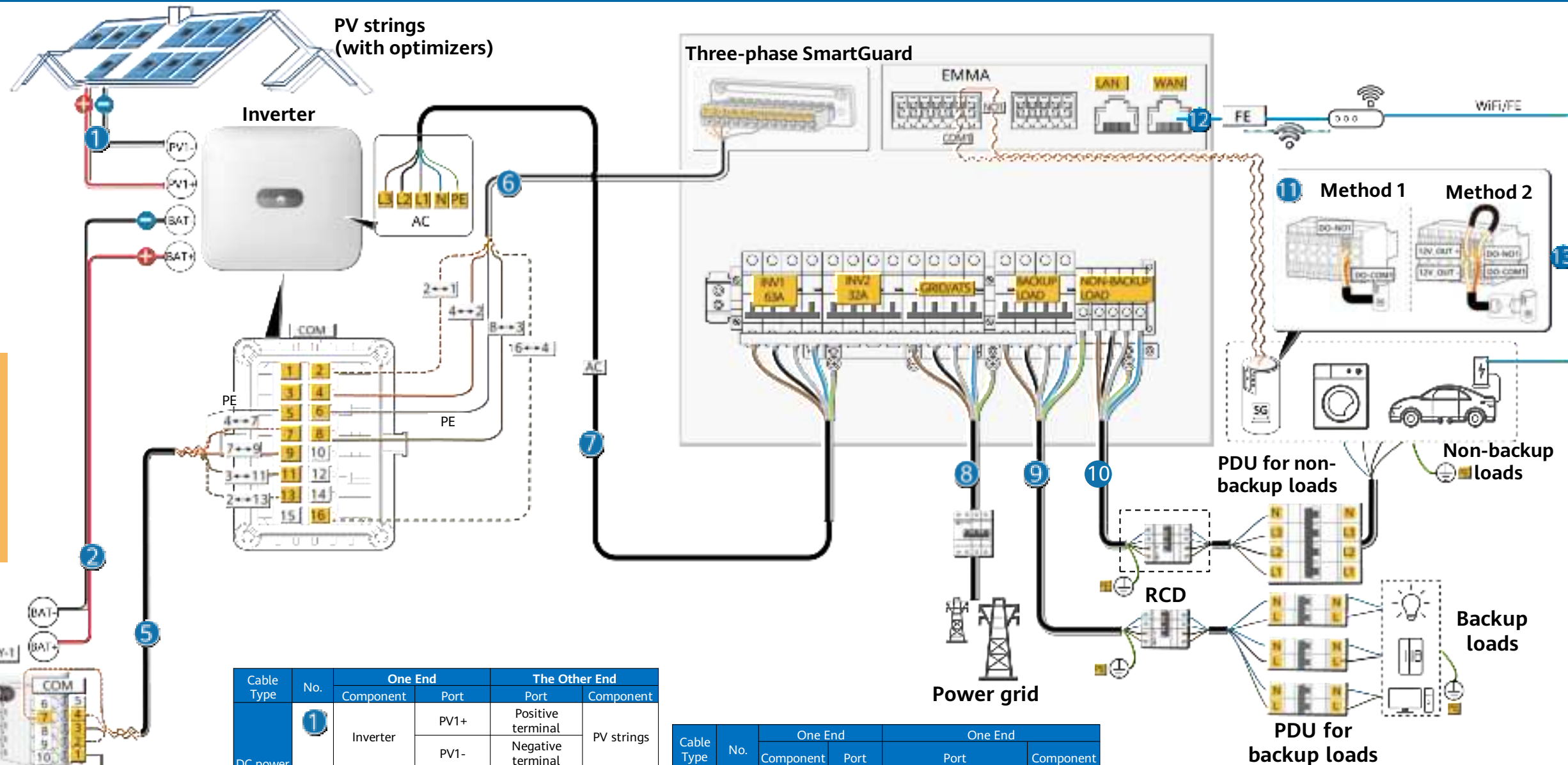
### 3 Cable Connections (Three-Phase Inverter M1/MB0 + ESS S0 + SmartGuard)

#### DANGER

- Before connecting cables, ensure that all switches are OFF. Otherwise, electric shocks may occur.
- An RCD must be installed before the backup load. During off-grid operation, the main circuit breaker does not provide protection. Electric leakage on the load may result in electric shocks.
- A main circuit breaker with the leakage protection function must be installed. Its rated residual operating current must be  $\geq$  Number of M1 inverters  $\times$  100 mA or  $\geq$  Number of MB0 inverters  $\times$  300 mA.

#### NOTICE

- Signal cables must be outdoor shielded twisted pair cables.
- Only one inverter can be connected to the SmartGuard.
- The PEN of the SmartGuard-63A-T0 backup power port must be connected, but the PEN of the SmartGuard-63A-AUT0 backup power port does not need to be connected.



Cable Type	No.	One End		The Other End	
		Component	Port	Port	Component
DC power cable	1	Inverter	PV1+	Positive terminal	PV strings
			PV1-	Negative terminal	
	2	Inverter	BAT+	BAT+	ESS 1
Signal cable	3	ESS 1	BAT+	BAT+	ESS 2
			BAT-	BAT-	
	4	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 1	COM-8 (left)	COM-8 (right)	ESS 2
			COM-9 (left)	COM-9 (right)	
			COM-13	COM-2 (right)	
			COM-11	COM-3 (right)	
	5	Inverter	COM-7	COM-4 (right)	ESS 1
			COM-9	COM-7 (right)	
			COM-5 (shield layer)	COM-1 (right) (shield layer)	
			COM-16	COM-4	
	6	Inverter	COM-2	COM-1	SmartGuard
			COM-4	COM-2	
			COM-8	COM-3	
			COM-16	COM-4	

Cable Type	No.	One End		One End	
		Component	Port	Port	Component
AC power cable	7	Inverter	AC-L1	INV1-L1	SmartGuard
			AC-L2	INV1-L2	
			AC-L3	INV1-L3	
			AC-N	INV1-N	
		Grid	L1	GRID/ATS-L1	SmartGuard
			L2	GRID/ATS-L2	
			L3	GRID/ATS-L3	
			N	GRID/ATS-N	
		PDU for backup loads	PE	GRID/ATS-PE	SmartGuard
			L1	BACKUP LOAD-L1	
AC power cable	8	Grid	L1	GRID/ATS-L1	SmartGuard
			L2	GRID/ATS-L2	
			L3	GRID/ATS-L3	
			N	GRID/ATS-N	
		PDU for backup loads	PE	GRID/ATS-PE	SmartGuard
			L1	BACKUP LOAD-L1	
AC power cable	9	PDU for backup loads	L1	BACKUP LOAD-L1	SmartGuard
			L2	BACKUP LOAD-L2	
			L3	BACKUP LOAD-L3	
			N	BACKUP LOAD-N	
		PDU for non-backup loads	PE	BACKUP LOAD-PE	SmartGuard
			L1	NON-BACKUP LOAD-L1	
AC power cable	10	PDU for non-backup loads	L1	NON-BACKUP LOAD-L1	SmartGuard
			L2	NON-BACKUP LOAD-L2	
			L3	NON-BACKUP LOAD-L3	
			N	NON-BACKUP LOAD-N	
		PDU for non-backup loads	PE	NON-BACKUP LOAD-PE	SmartGuard
			L1	NON-BACKUP LOAD-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.			
		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.			

Cable Type	No.	One End		The Other End	
		Component	Port	Port	Component
Signal cable	12	EMMA	WAN	LAN	Router
	13	Charger	FE	LAN	Router



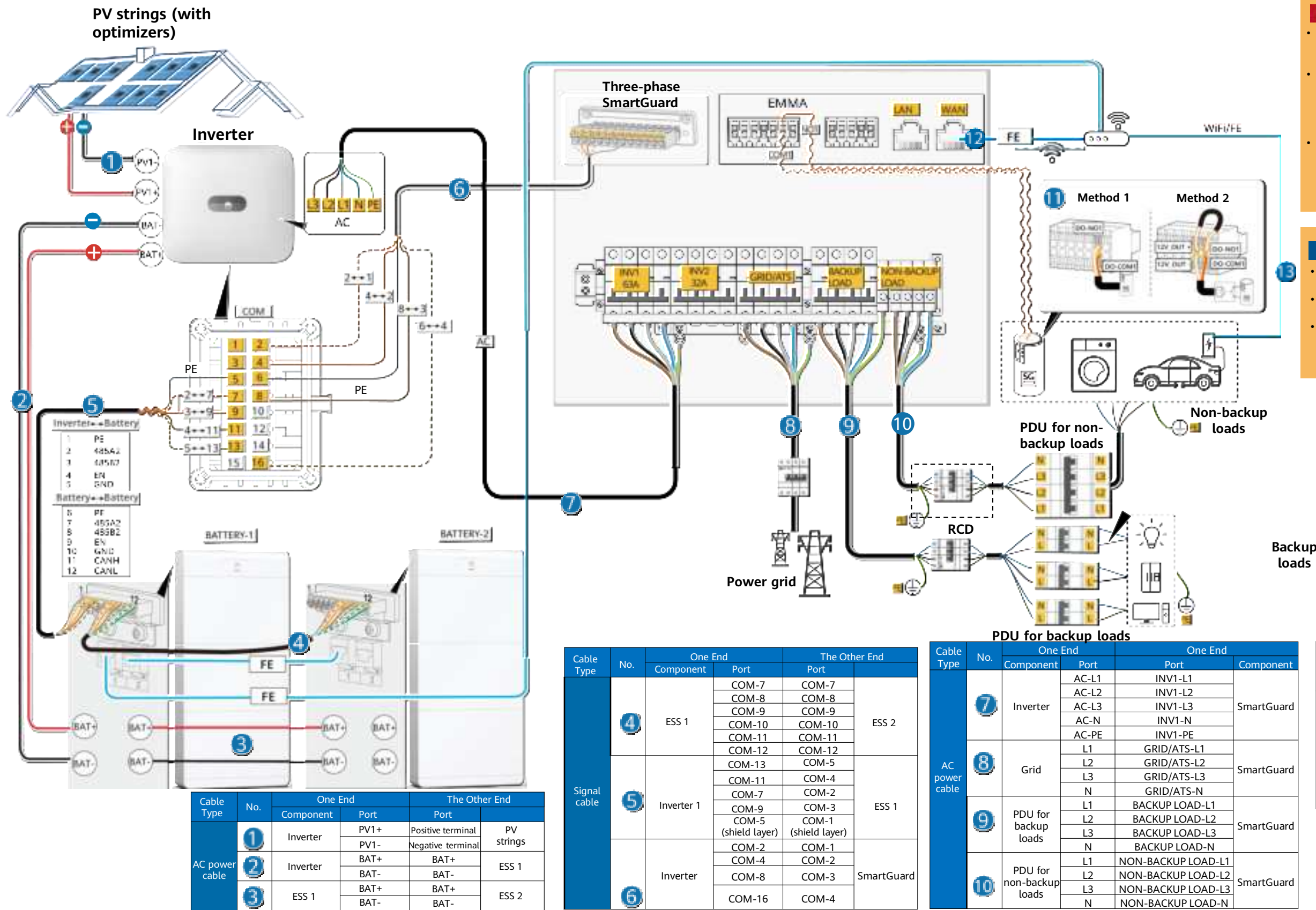
# Residential Smart PV Solution Quick Guide

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



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## Cable Connections (Three-Phase Inverter M1/MB0 + ESS S1 + SmartGuard)



- ⚠ DANGER**
- Before connecting cables, ensure that all switches are OFF. Otherwise, electric shocks may occur.
  - An RCD must be installed before the backup load. During off-grid operation, the main circuit breaker does not provide protection. Electric leakage on the load may result in electric shocks.
  - A main circuit breaker with the leakage protection function must be installed. Its rated residual operating current must be  $\geq$  Number of M1 inverters  $\times$  100 mA or  $\geq$  Number of MB0 inverters  $\times$  300 mA..

- NOTICE**
- Signal cables must be outdoor shielded twisted pair cables.
  - Only one inverter can be connected to the SmartGuard.
  - The PEN of the SmartGuard-63A-T0 backup power port must be connected, but the PEN of the SmartGuard-63A-AUT0 backup power port does not need to be connected.

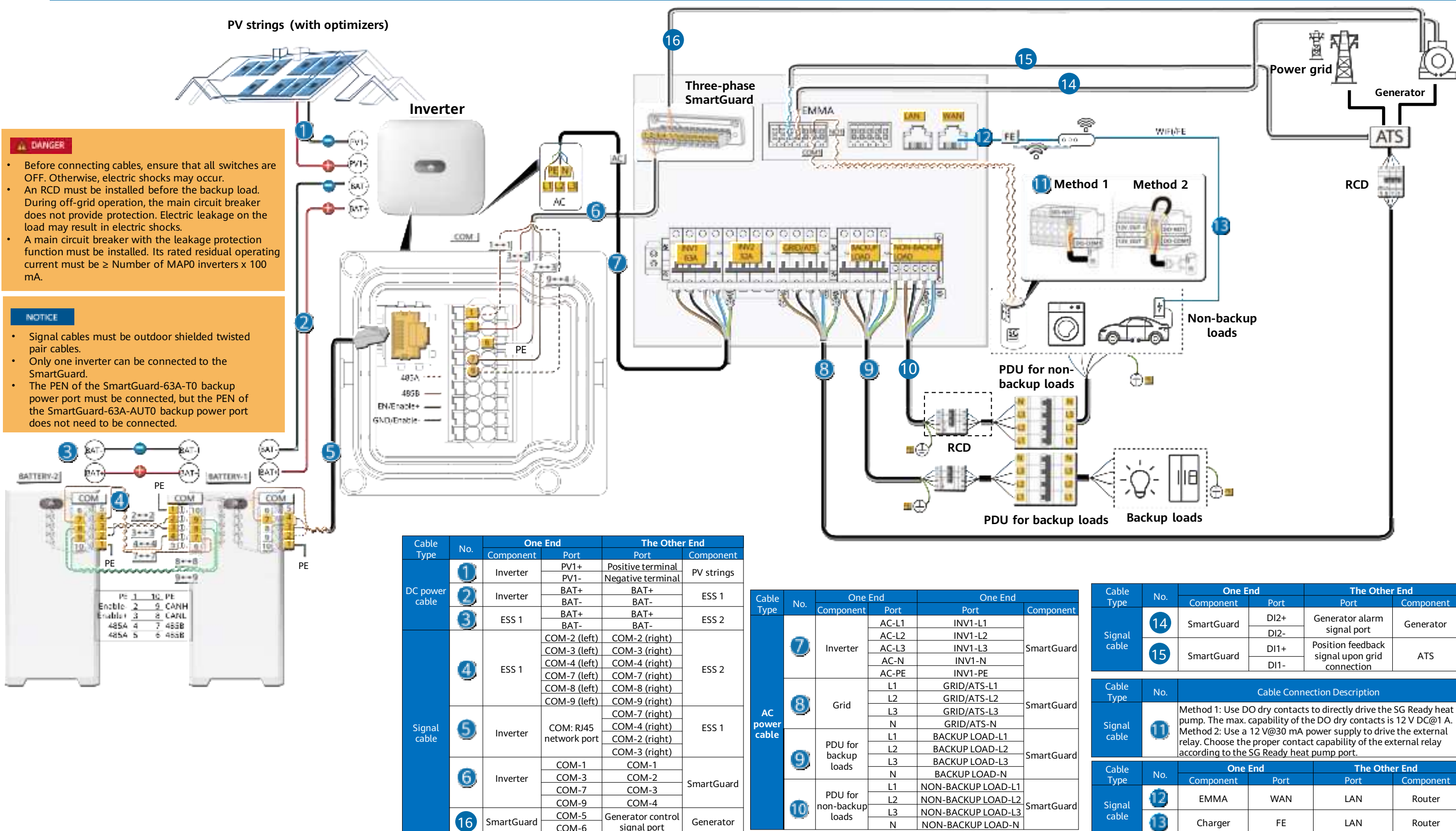
# Residential Smart PV Solution Quick Guide

## (Three-Phase PV+ESS Scenario + SmartGuard Networking)



# 3

## Cable Connections (Three-Phase Inverter MAP0 + ESS S0 + SmartGuard Connected to All Loads)



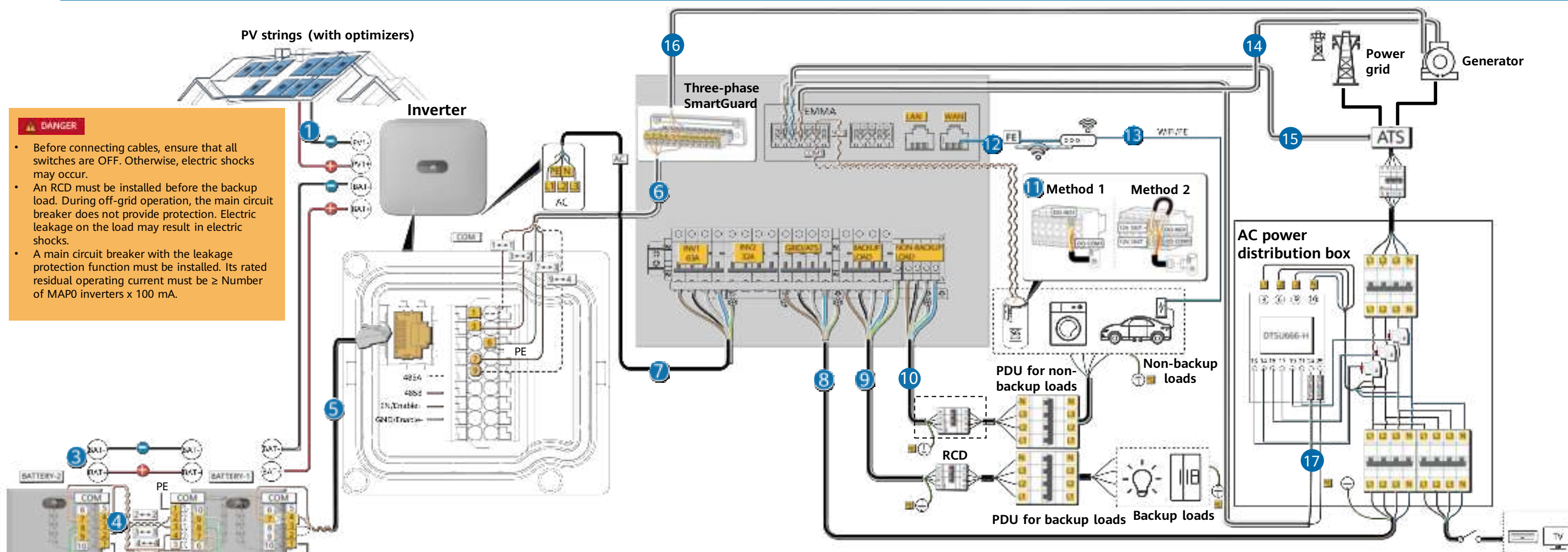


# Residential Smart PV Solution Quick Guide

## (Three-Phase PV+ESS Scenario + SmartGuard Networking)



### 3 Cable Connections (Three-Phase Inverter MAP0 + ESS S0 + SmartGuard Connected to Some of Loads)



Cable Type	No.	One End		The Other End	
		Component	Port	Port	Component
DC power Cable	1	Inverter	PV1+	Positive terminal	PV strings
	2	Inverter	PV1-	Negative terminal	PV strings
	3	ESS 1	BAT+	BAT+	ESS 1
Signal Cable	4	ESS 1	BAT-	BAT-	ESS 2
	5	Inverter	COM-2 (left)	COM-2 (right)	ESS 2
	6	Inverter	COM-3 (left)	COM-3 (right)	ESS 2
	7	Inverter	COM-4 (left)	COM-4 (right)	ESS 2
	8	Inverter	COM-7 (left)	COM-7 (right)	ESS 2
	9	Inverter	COM-8 (left)	COM-8 (right)	ESS 2
	10	Inverter	COM-9 (left)	COM-9 (right)	ESS 2
	11	Inverter	COM-7 (right)	COM-4 (right)	ESS 1
	12	Inverter	COM-4 (right)	COM-2 (right)	ESS 1
	13	Inverter	COM-2 (right)	COM-3 (right)	ESS 1
AC power cable	14	SmartGuard	COM-1	COM-1	SmartGuard
	15	SmartGuard	COM-3	COM-2	SmartGuard
Signal cable	16	SmartGuard	COM-7	COM-3	SmartGuard
	17	SmartGuard	COM-9	COM-4	SmartGuard
Signal cable	18	SmartGuard	COM-5	Generator control signal port	Generator
	19	SmartGuard	COM-6	Generator control signal port	Generator

Cable Type	No.	One End		One End	
		Component	Port	Port	Component
AC power cable	7	Inverter	AC-L1	INV1-L1	SmartGuard
	8	Inverter	AC-L2	INV1-L2	SmartGuard
	9	Inverter	AC-L3	INV1-L3	SmartGuard
	10	Inverter	AC-N	INV1-N	SmartGuard
	11	Inverter	AC-PE	INV1-PE	SmartGuard
AC power cable	12	Grid	L1	GRID/ATS-L1	SmartGuard
	13	Grid	L2	GRID/ATS-L2	SmartGuard
	14	Grid	L3	GRID/ATS-L3	SmartGuard
	15	Grid	N	GRID/ATS-N	SmartGuard
AC power cable	16	PDU for backup loads	L1	BACKUP LOAD-L1	SmartGuard
	17	PDU for backup loads	L2	BACKUP LOAD-L2	SmartGuard
	18	PDU for backup loads	L3	BACKUP LOAD-L3	SmartGuard
	19	PDU for backup loads	N	BACKUP LOAD-N	SmartGuard
AC power cable	20	PDU for non-backup loads	L1	NON-BACKUP LOAD-L1	SmartGuard
	21	PDU for non-backup loads	L2	NON-BACKUP LOAD-L2	SmartGuard
	22	PDU for non-backup loads	L3	NON-BACKUP LOAD-L3	SmartGuard
	23	PDU for non-backup loads	N	NON-BACKUP LOAD-N	SmartGuard

Cable Type	No.	One End		The Other End	
		Component	Port	Port	Component
Signal cable	14	SmartGuard	DI2+	Generator alarm signal port	Generator
	15	SmartGuard	DI2-	Position feedback signal upon grid connection	ATS
	17	SmartGuard	DI1+	Position feedback signal upon grid connection	ATS
Signal cable	16	SmartGuard	485A2	24	DTSU666-H
	17	SmartGuard	485B2	25	DTSU666-H

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.			
	11	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.			

Cable Type	No.	One End		The Other End	
		Component	Port	Port	Component
Signal cable	12	EMMA	WAN	LAN	Router
	13	Charger	FE	LAN	Router

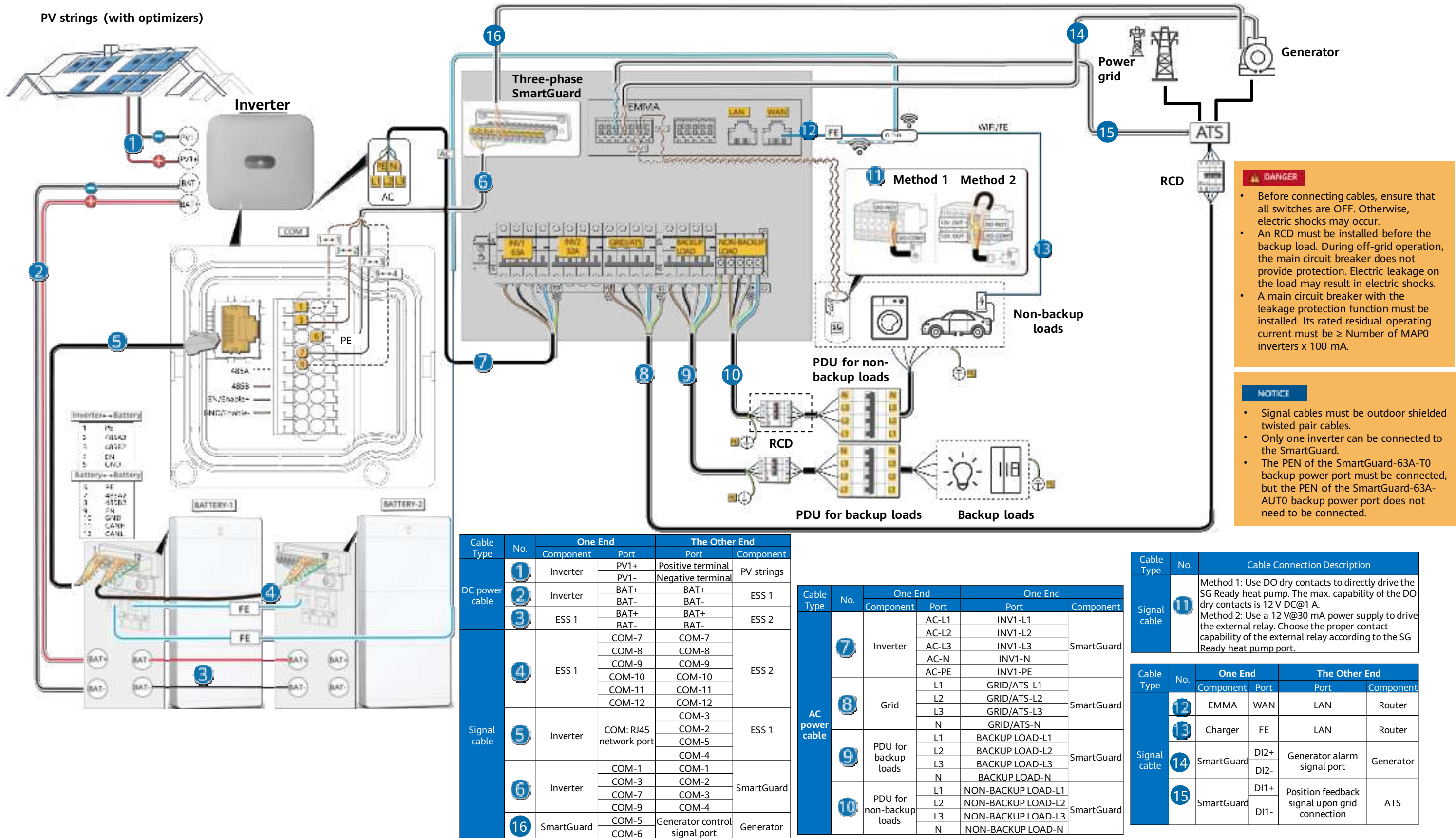


# Residential Smart PV Solution Quick Guide

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



## 3 Cable Connections (Three-Phase Inverter MAP0 + ESS S1 + SmartGuard Connected to All Loads)



# Residential Smart PV Solution Quick Guide

## (Three-Phase PV+ESS Scenario + SmartGuard 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.



Huawei FusionSolar

### Installer Registration

#### Initial registration

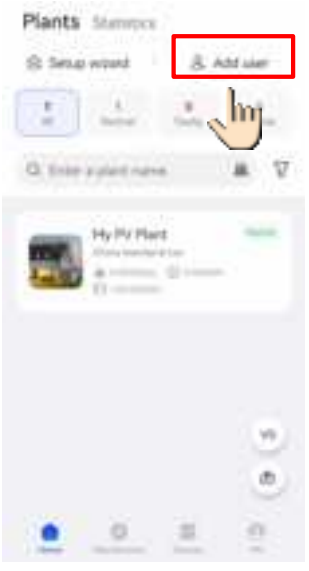
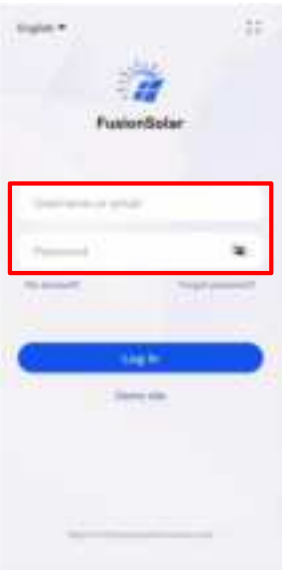
Create the first installer account, and generate a domain named after the company.



or

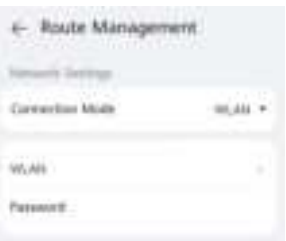
#### Non-initial registration

To create multiple installer accounts for a company, log in to the FusionSolar app and tap **Invite user** to create another installer account.

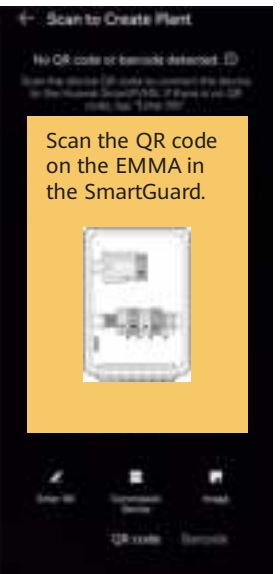


### Setup Wizard (Connecting to the EMMA WLAN for Commissioning)

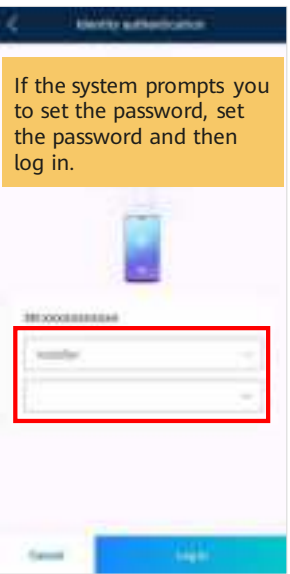
#### Set the WLAN information of the charger.



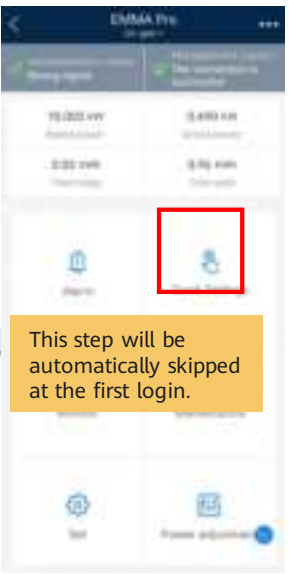
If the charger connects to the router through WLAN, you need to log in to the charger to set the WLAN information before deploying the EMMA.



Scan the QR code on the EMMA in the SmartGuard.



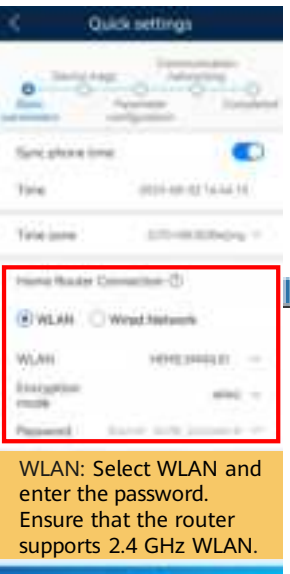
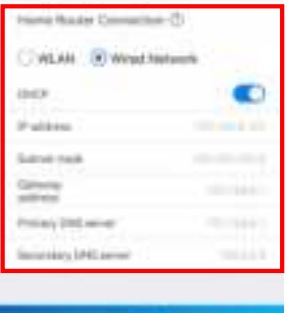
If the system prompts you to set the password, set the password and then log in.



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.

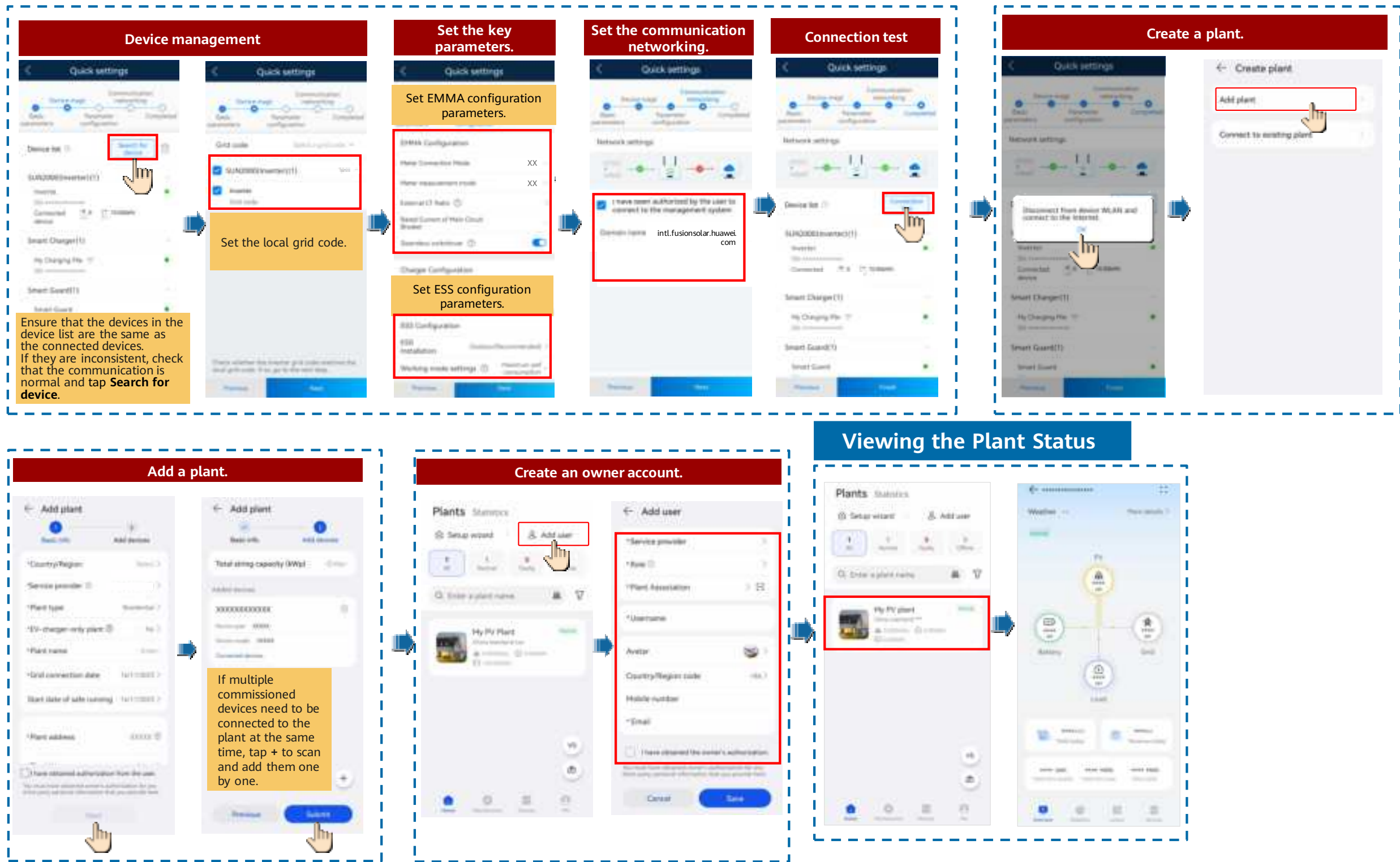


WLAN: Select WLAN and enter the password. Ensure that the router supports 2.4 GHz WLAN.



# Residential Smart PV Solution Quick Guide

## (Single-Phase PV+ESS Scenario + SmartGuard Networking)



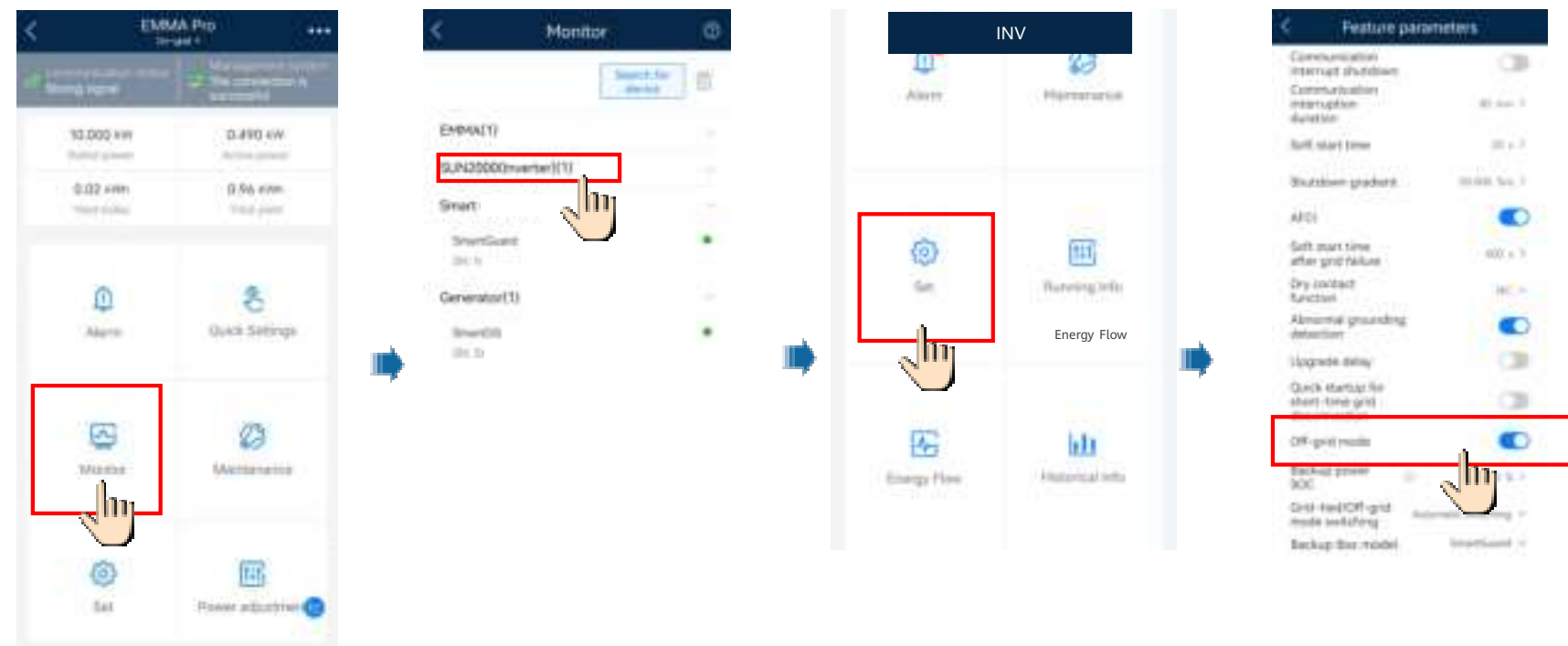
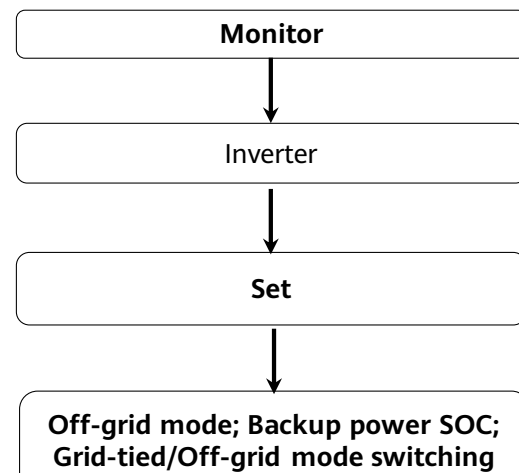
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(Single-Phase PV+ESS Scenario + SmartGuard Networking)

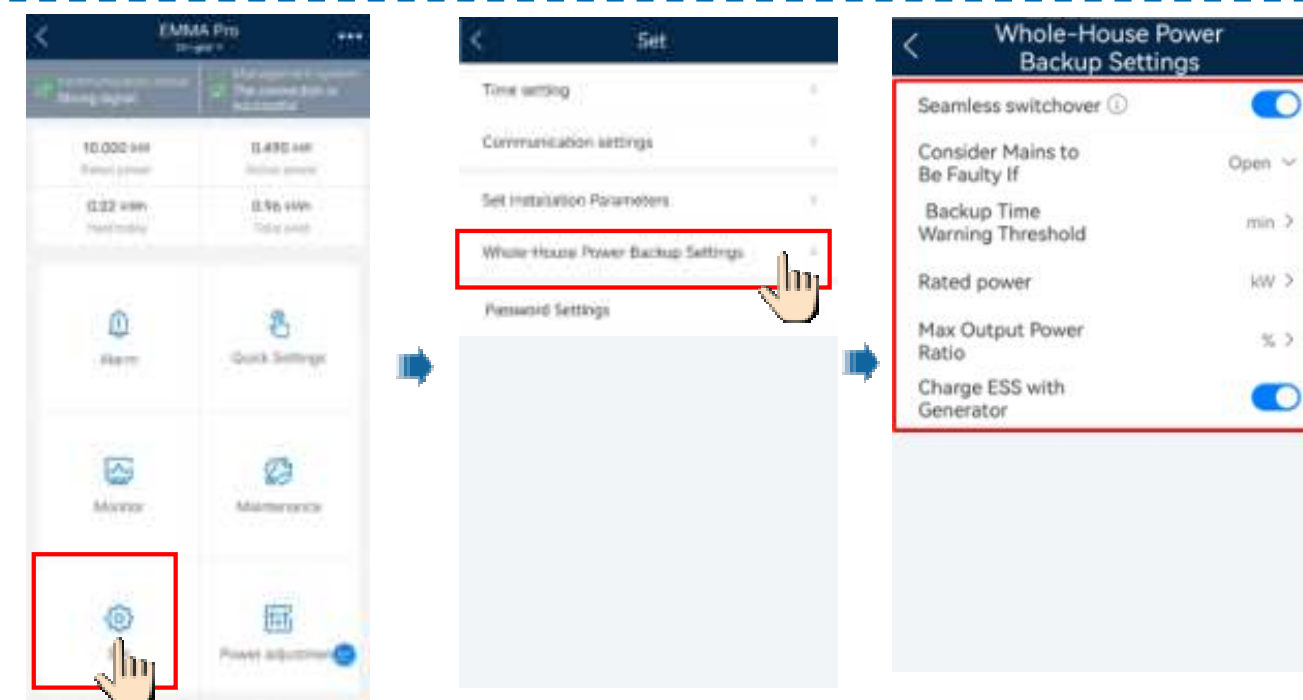
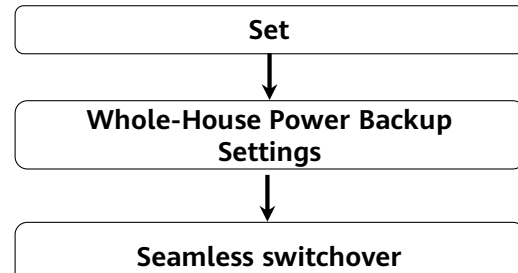


## 5 On/Off-Grid Control Parameters

### Enabling Off-Grid Mode



### Setting Seamless Switchover





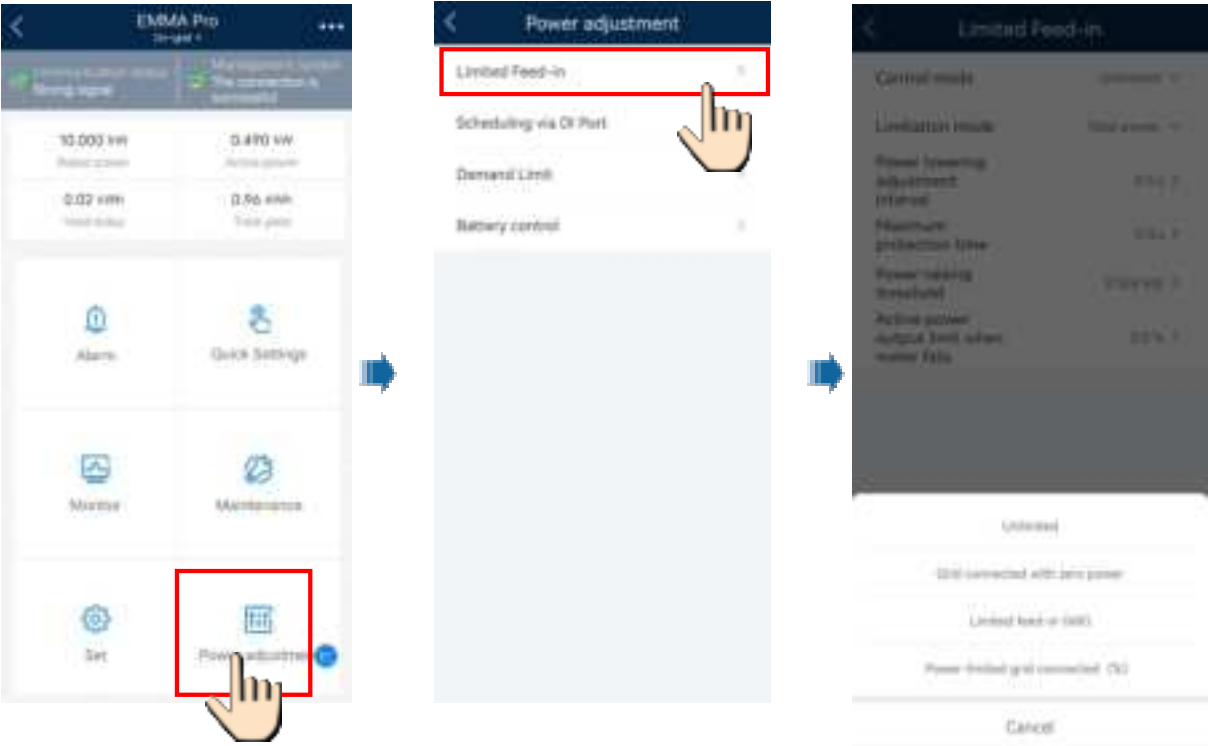
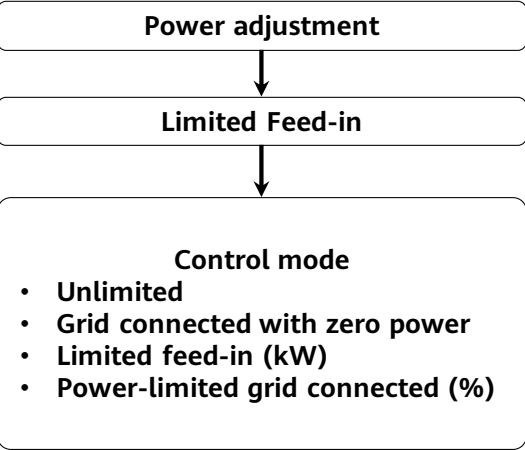
# Residential Smart PV Solution Quick Guide

(Single-Phase PV+ESS Scenario + SmartGuard Networking)



## 6 Grid-tied Point Parameters

### Setting Grid-tied Point Control



# Residential Smart PV Solution Quick Guide

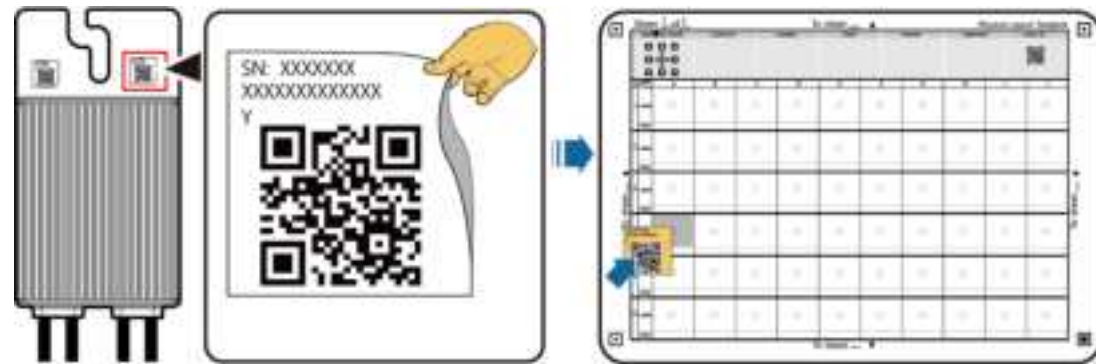
## (Single-Phase PV+ESS Scenario + SmartGuard Networking)



### 7 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

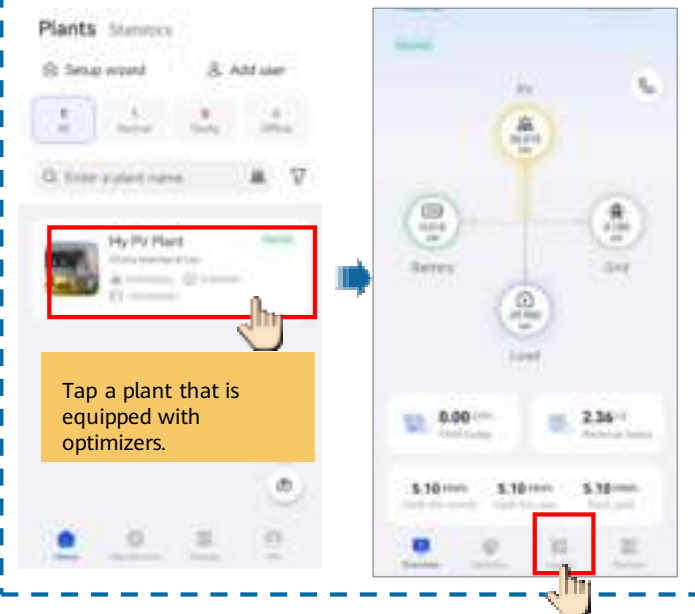
Ensure that the four positioning points on the template are within the frame.

Positioning point



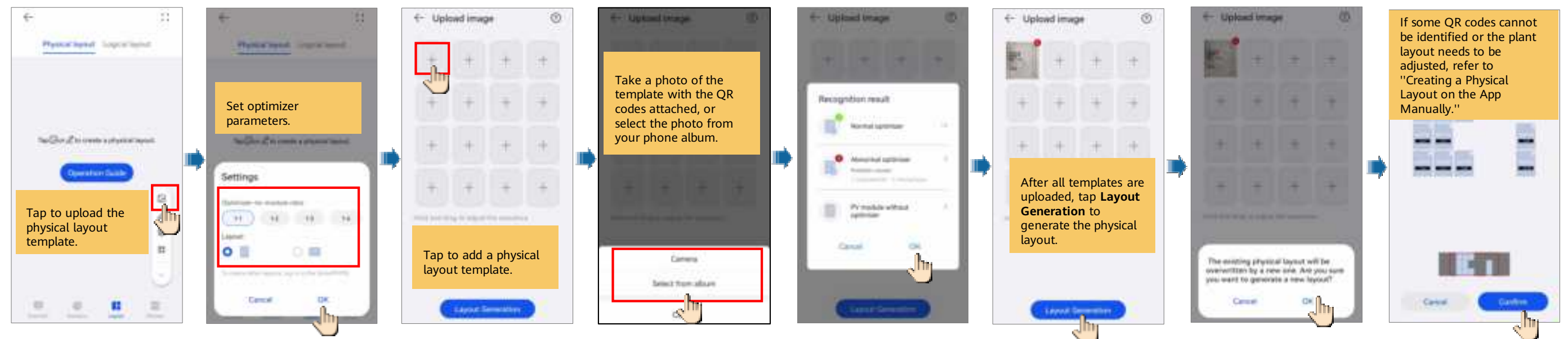
#### Generating a Physical Layout on the App

Enter the Layout screen.



#### Generating a Physical Layout on the App Automatically

Upload the template and generate a layout.





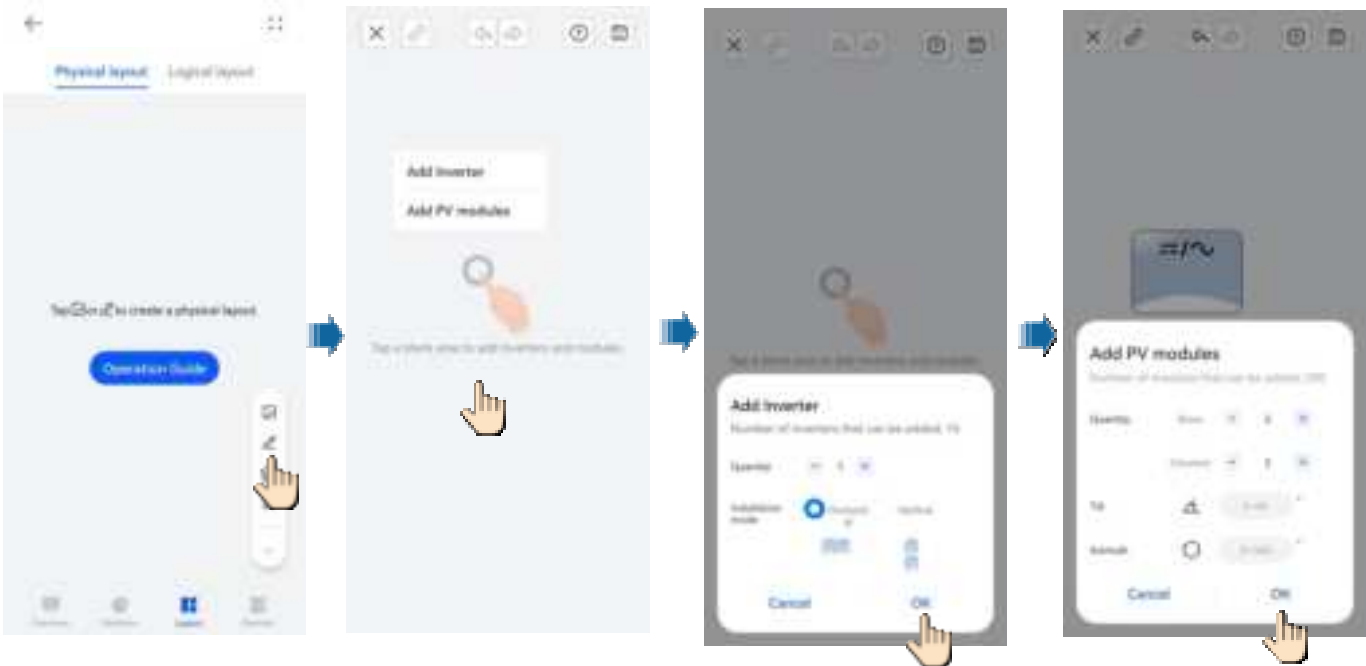
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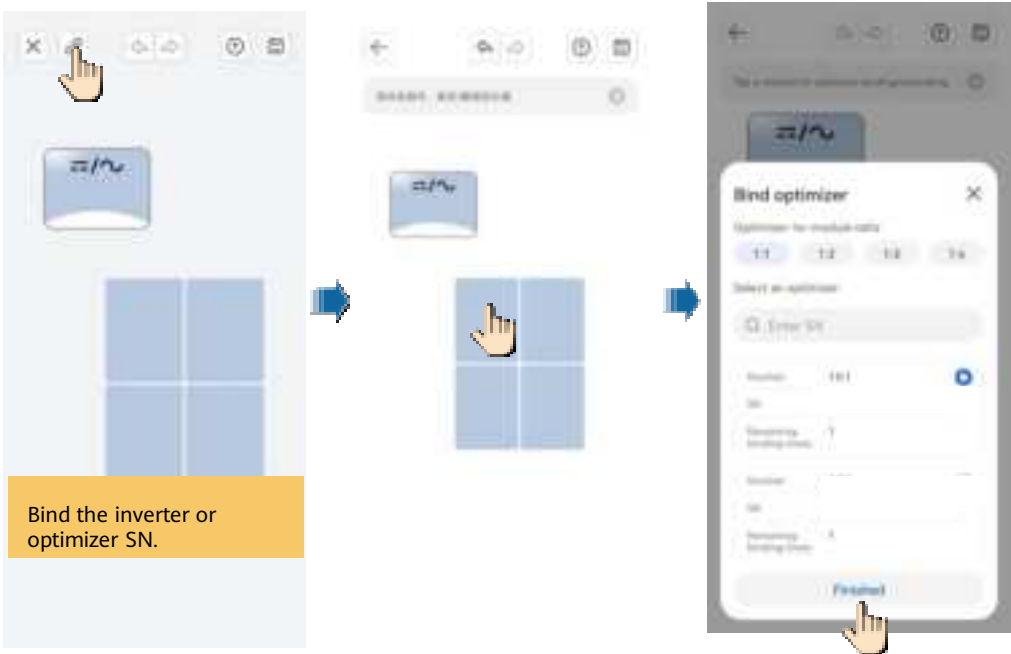


## Creating a Physical Layout on the App Manually

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.

