Felicitysolar®

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PARALLEL GUIDE

Solar Inverter

IVEM Series(5KVA)

Solar inverter

Contents

1. INTRODUCTION

This inverter can be used in parallel with two different operation modes.

1. Parallel operation in single phase with up to 12 units. The supported maximum output power is 60KW/60KVA.

2. Maximum twelve units work together to support three-phase equipment. Ten units support one phase maximum.

The supported maximum output power is 60KW/60KVA and one phase can be up to 50KW/50KVA.

NOTE: If this unit is bundled with share current cable and parallel cable, this inverter is default supported parallel operation. You may skip section 2.

2. PACKAGE CONTENTS

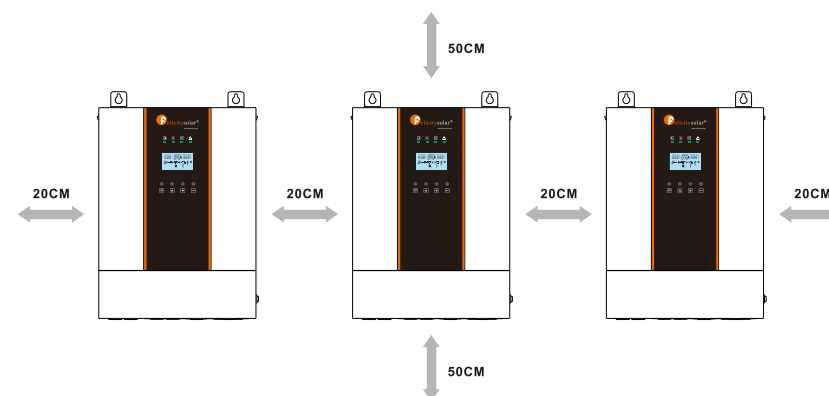In parallel kit, you will find the following items in the package:

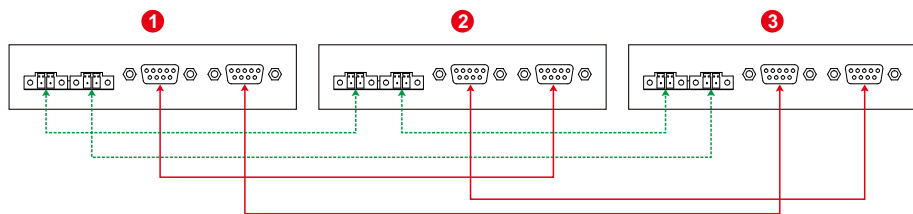Parallel communication cable   Current sharing cable

3. MOUNTING THE UNIT

When installing multiple units, please follow below chart.

50CM

20CM   20CM   20CM   20CM

50CM

NOTE: For proper air circulation to dissipate heat, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and below the unit. Be sure to install each unit in the same level.

4. WIRING CONNECTION

This installation steps are only applied to 5K model.
Step 1: Remove wire cover by unscrewing all screws.

Step 2: Communication Connection

4.1 Parallel Operation in Single phase

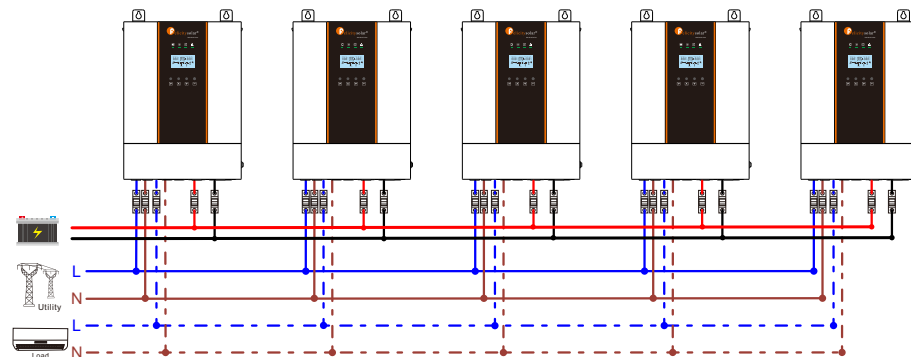Two inverters in parallel:

Power Connection

Communication Connection

WARNING: Before starting up inverters, please connect all N wires of AC output together.

Three inverters in parallel:

Power Connection

Communication Connection

WARNING: Before starting up inverters, please connect all N wires of AC output together.

Four inverters in parallel:
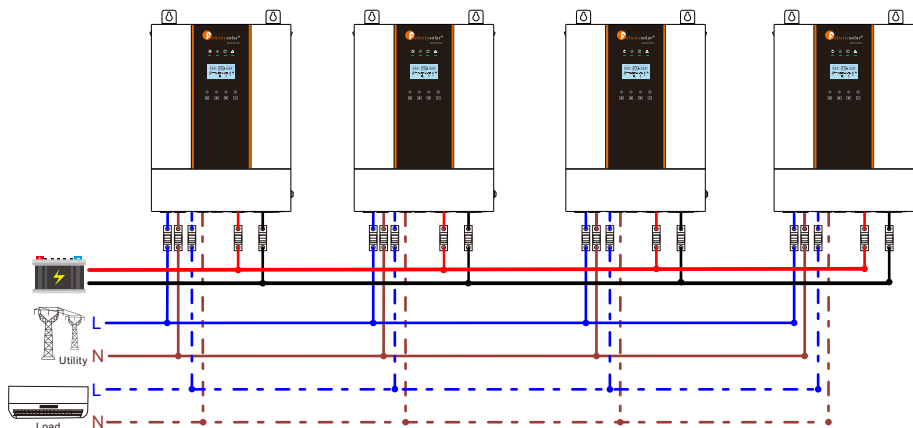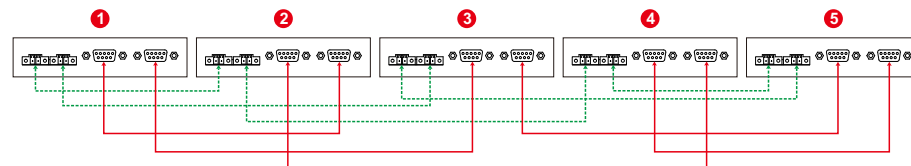
Power Connection

Communication Connection
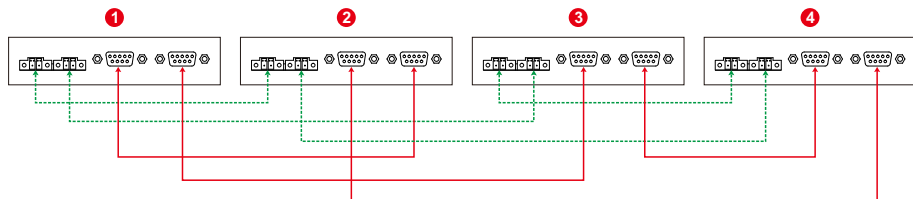
WARNING: Before starting up inverters, please connect all N wires of AC output together.
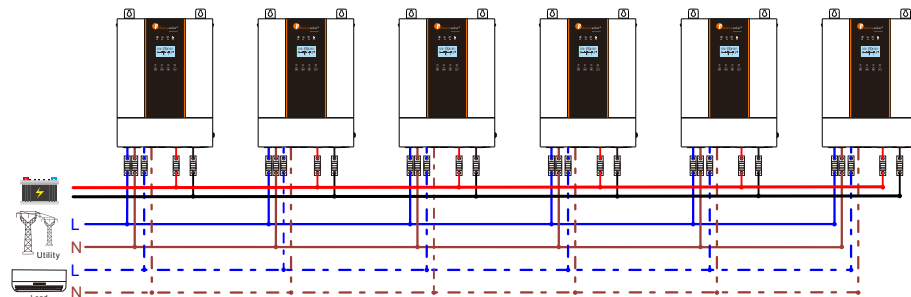
Five inverters in parallel:
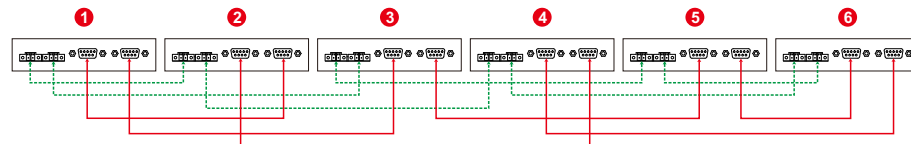
Power Connection

Communication Connection

WARNING: Before starting up inverters, please connect all N wires of AC output together.
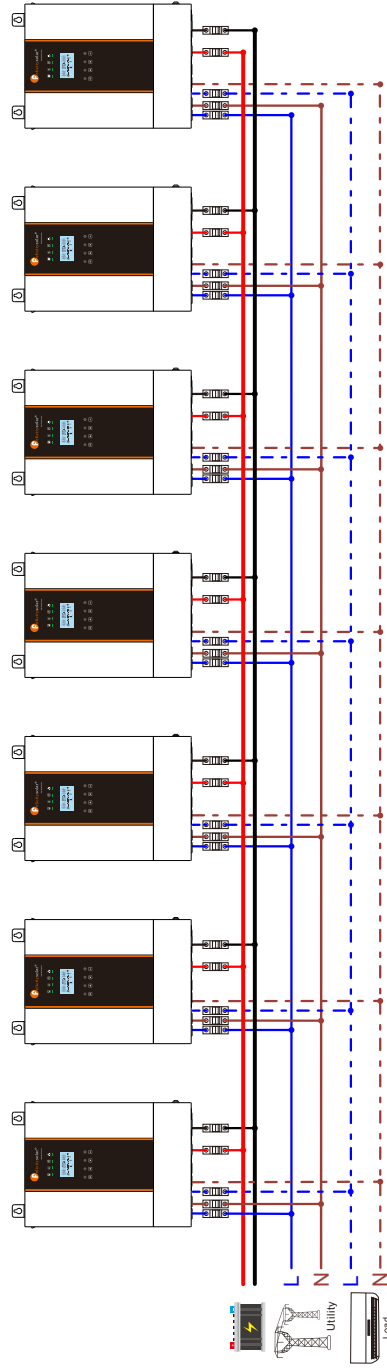
Six inverters in parallel:
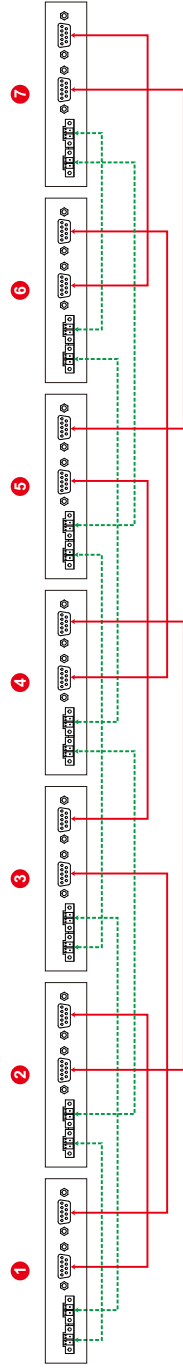
Power Connection

Communication Connection

WARNING: Before starting up inverters, please connect all N wires of AC output together.

Seven inverters in parallel:

Power Connection

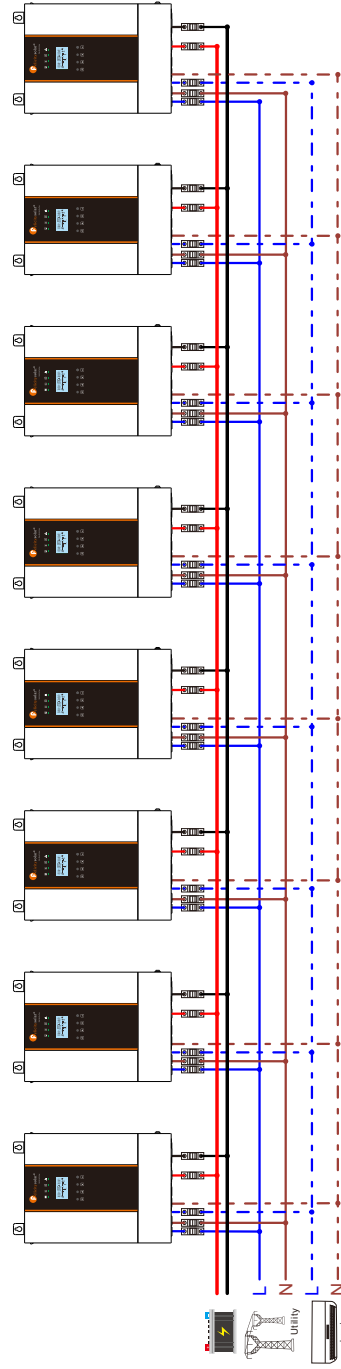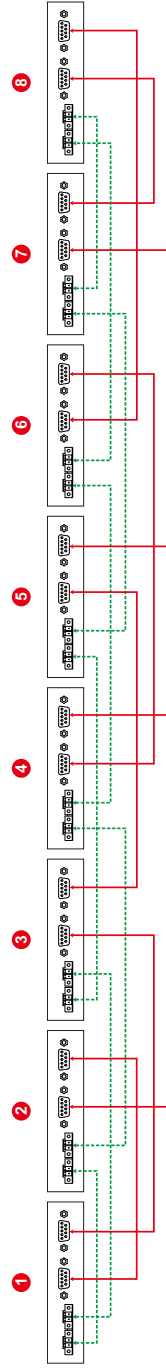
N   N

Utility   Load

Communication Connection

WARNING: Before starting up inverters, please connect all N wires of AC output together.

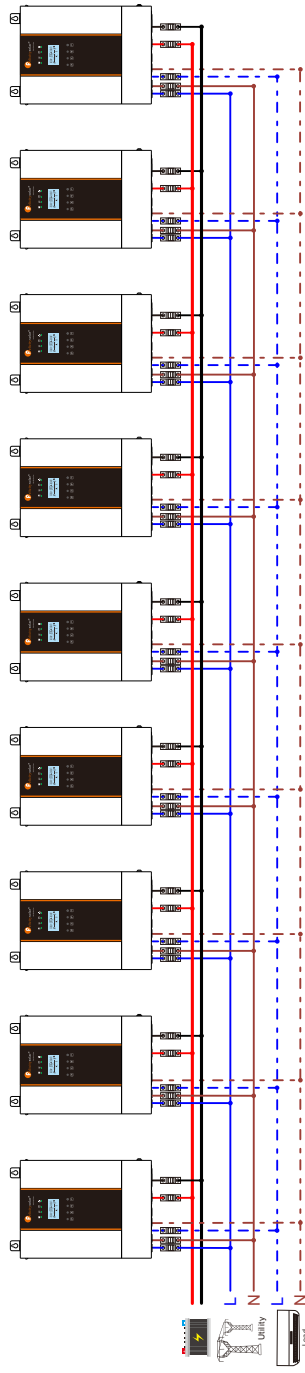Eight inverters in parallel:

Power Connection

N   N

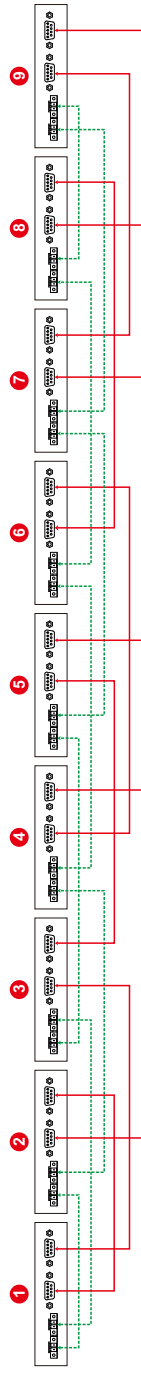Utility   Load

Communication Connection

WARNING: Before starting up inverter, please connect all N wires of AC output together.
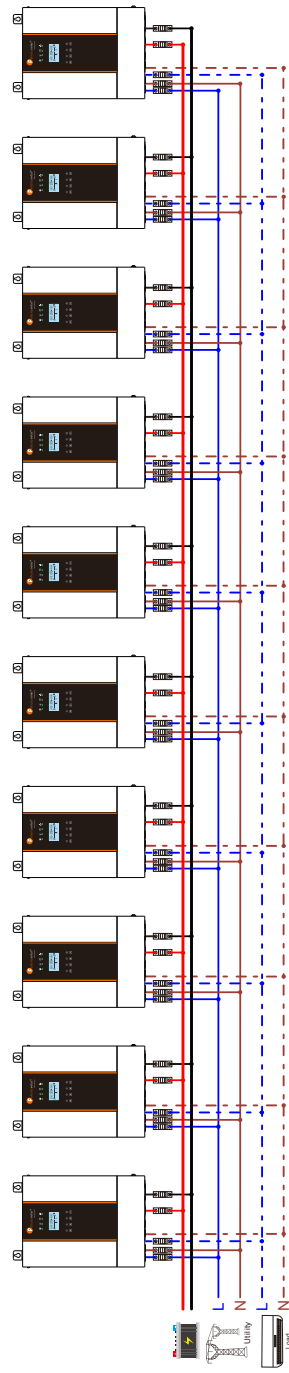
Nine inverters in parallel:
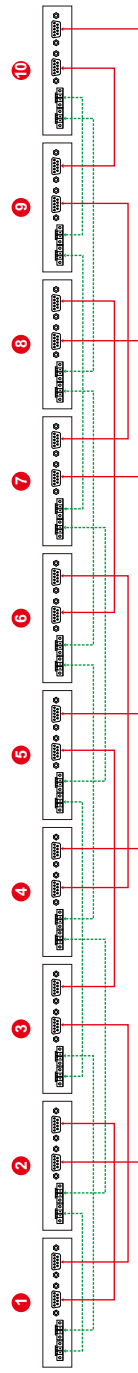
Power Connection

Communication Connection

WARNING: Before starting up inverters, please connect all N wires of AC output together.
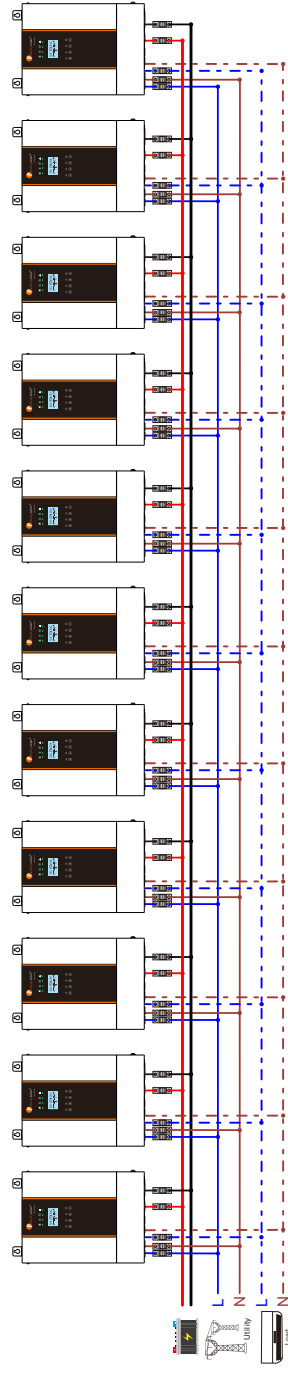
Ten inverters in parallel:
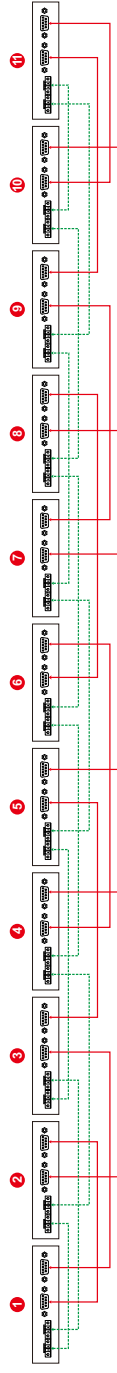
Power Connection

Communication Connection

WARNING: Before starting up inverters, please connect all N wires of AC output together.

Eleven inverters in parallel:
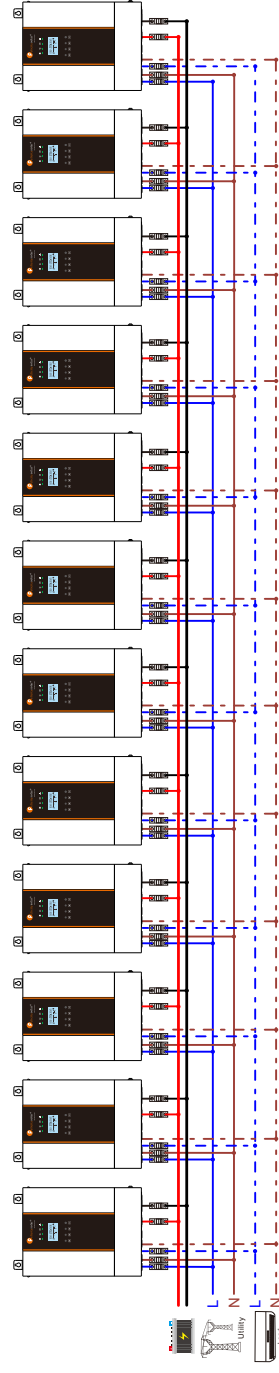
Power Connection
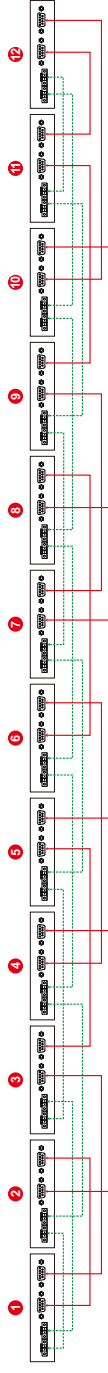

Communication Connection

WARNING: Before starting up inverters, please connect all N wires of AC output together.

Twelve inverters in parallel:

Power Connection
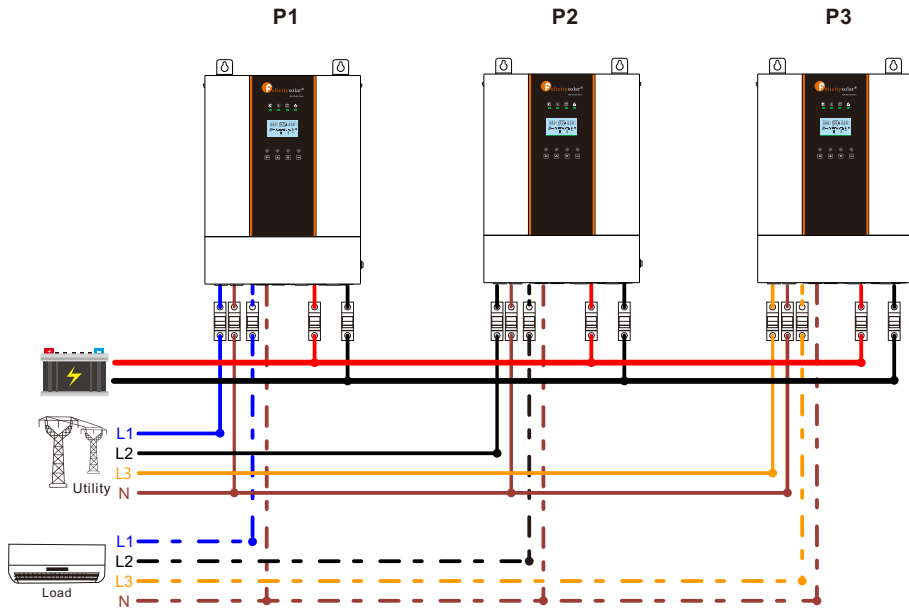

Communication Connection

WARNING: Before starting up inverters, please connect all N wires of AC output together.
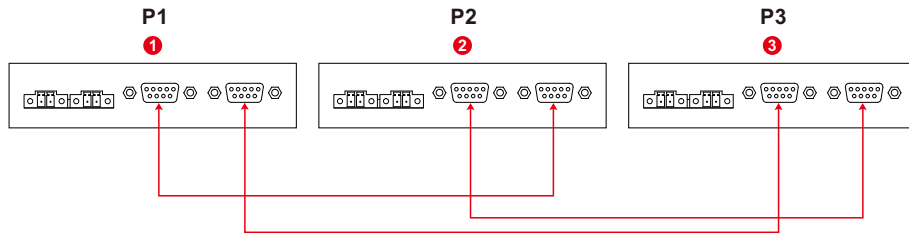
4.2 Support 3-phase equipment

One inverter in each phase:

Power Connection

P1   P2   P3

L1
L2
L3
N
Utility

L1
L2
L3
N
Load

Communication Connection

P1   P2   P3
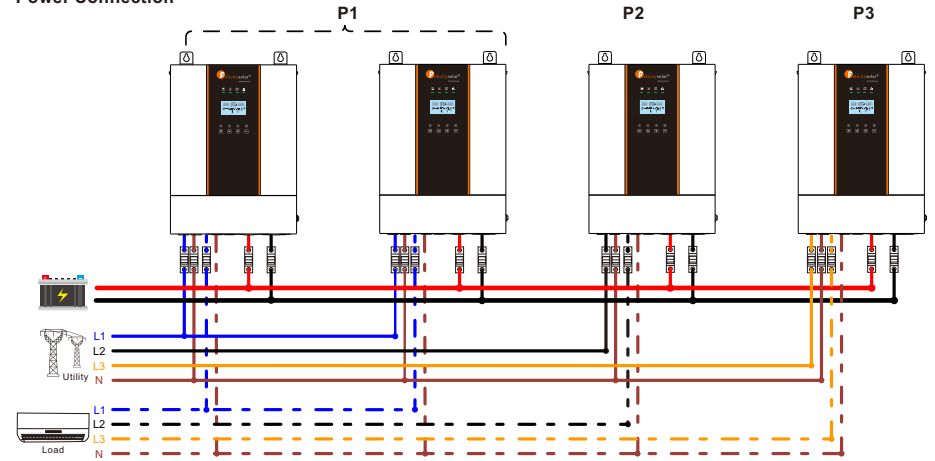①   ②   ③

WARNING:
1. Before starting up inverters, please connect all N wires of AC output together.
2. Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters.
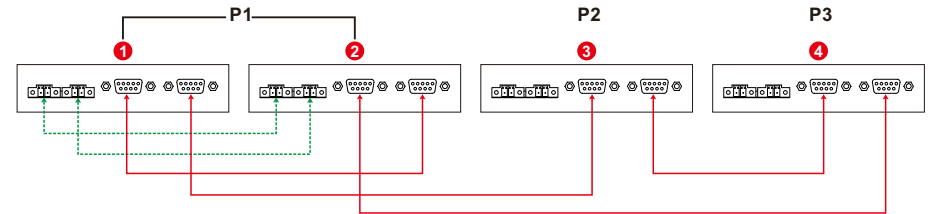
Note: It's up to customer's demand to pick 4 inverters on any phase.
P1: L1-phase, P2: L2-phase, P3: L3-phase.

Two inverters in one phase and only one inverter for the remaining phases:

Power Connection

P1   P2   P3

L1
L2
L3
N
Utility

L1
L2
L3
N
Load

Communication Connection

P1   P2   P3
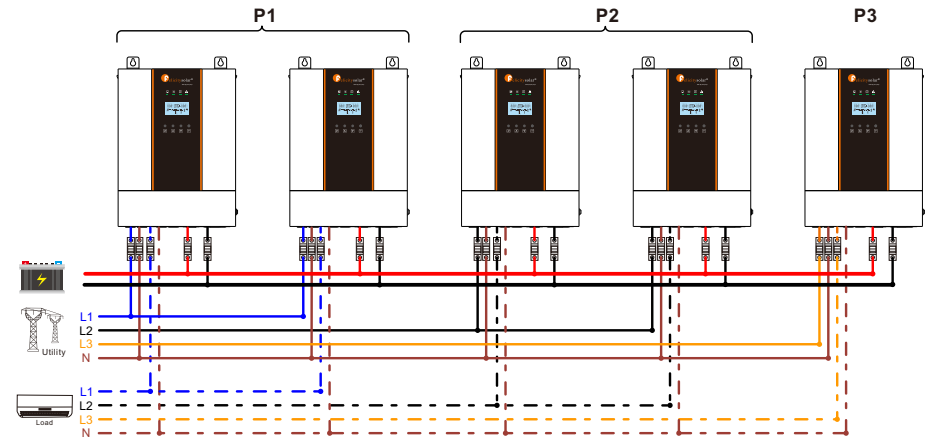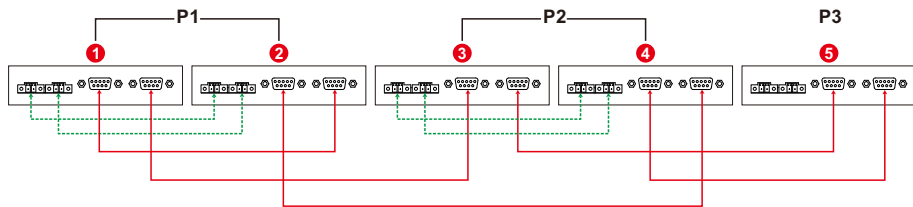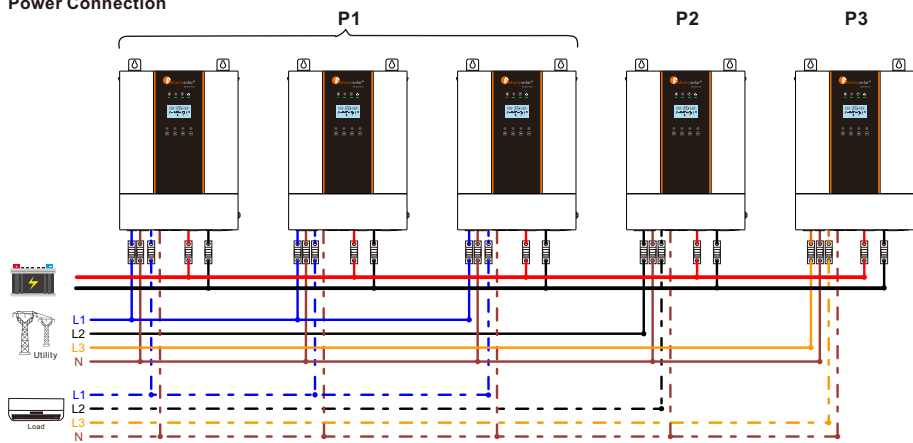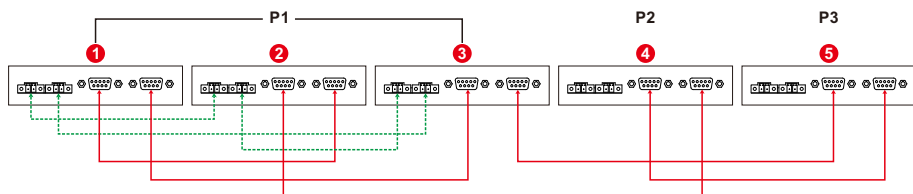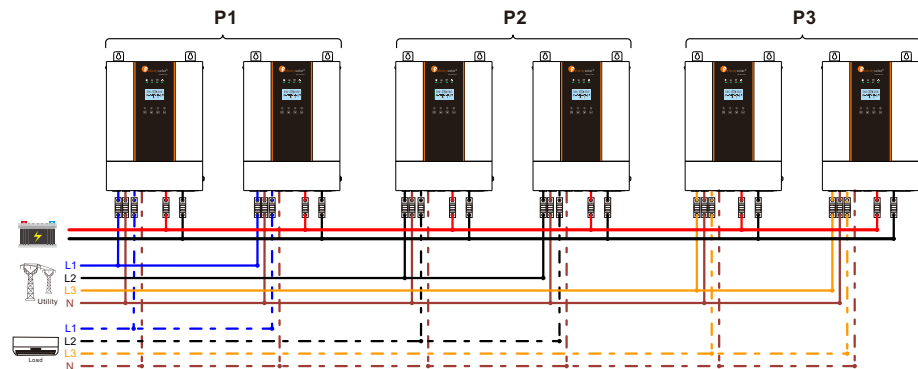①   ②   ③   ④

WARNING:
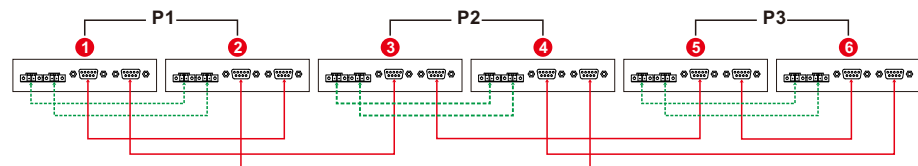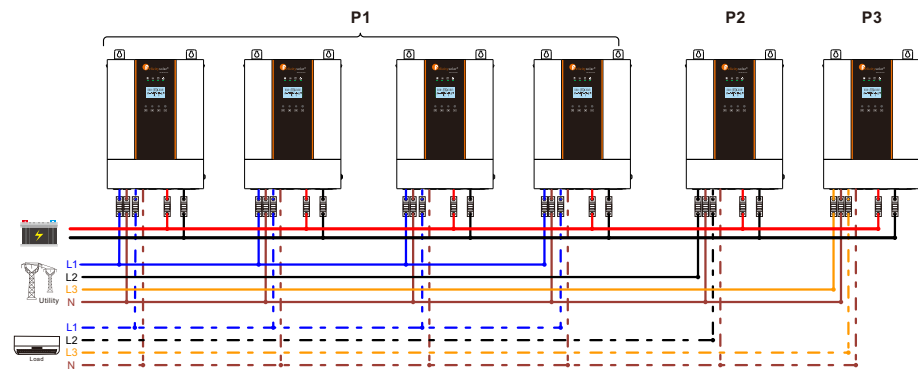1. Before starting up inverters, please connect all N wires of AC output together.
2. Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters.

Two inverters in two phases and only one inverter for the remaining phase:

Power Connection

P1   P2   P3

L1
L2
L3
N
Utility

L1
L2
L3
N
Load

Communication Connection

Three inverters in one phase and only one inverter for the remaining two phases:

Power Connection

Communication Connection

Two inverters in each phase:

Power Connection

Communication Connection

Four inverters in one phase and one inverter for the other two phases:

Power Connection

Communication Connection

P1   P2   P3

① ② ③ ④ ⑤ ⑥

Three inverters in one phase, two inverters in second phase and one inverter for the third phase:

Power Connection

P1   P2   P3

L1
L2
L3
N
Utility

L1
L2
L3
N
Load

Communication Connection

P1   P2   P3

① ② ③ ④ ⑤ ⑥

Three inverters in one phase and two inverters for the remaining two phases:

Power Connection

P3

P2

P1

L1 L2 L3 N
Utility

L1 L2 L3 N
Load

Communication Connection

P3

P2

P1

⑦ ⑥ ⑤ ④ ③ ② ①

Three inverters in two phases and only one inverter for the remaining phase:

Power Connection
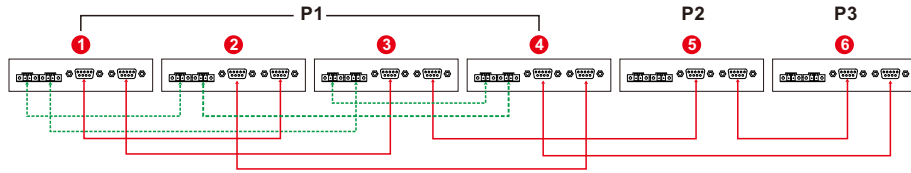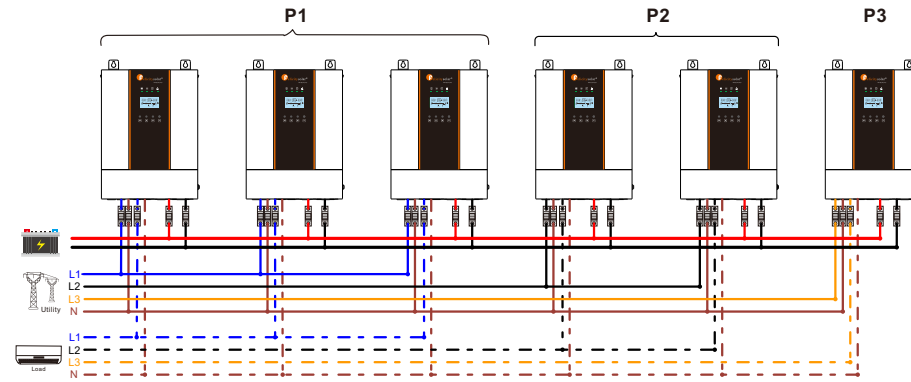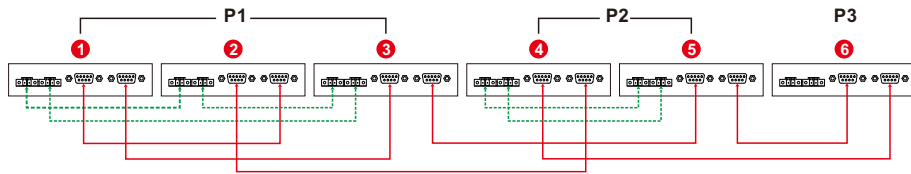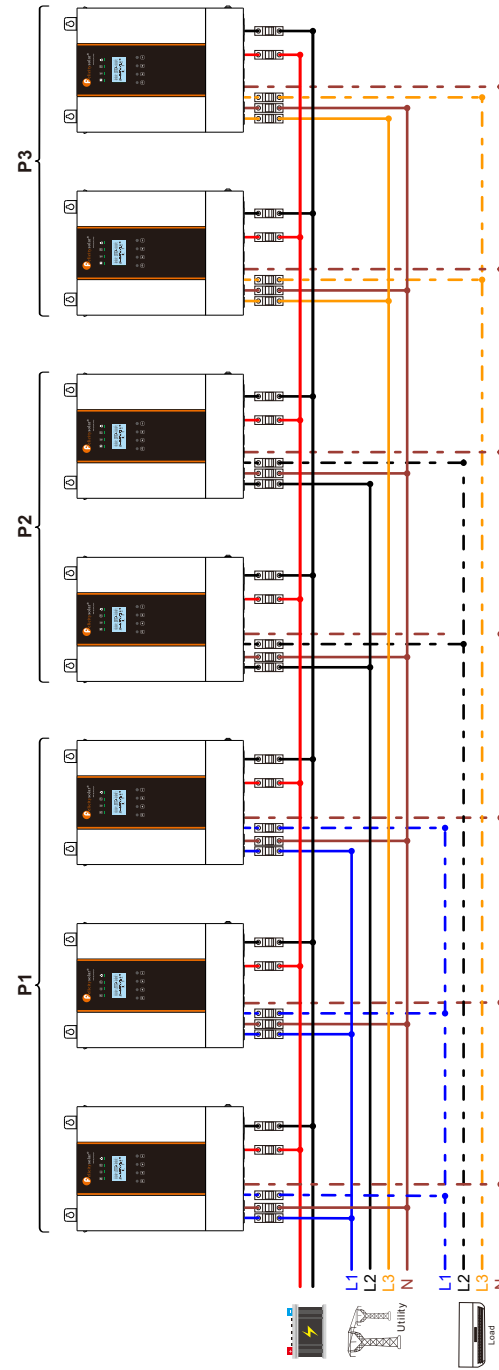
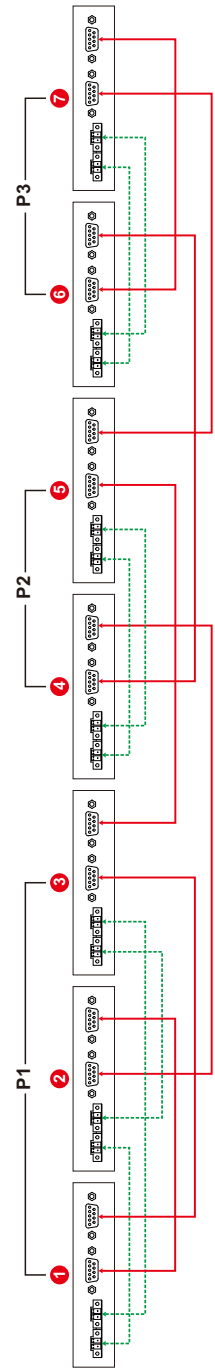**Communication Connection**

WARNING:
1. Before starting up inverters, please connect all N wires of AC output together.
2. Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters.

Three inverters in two phases and two inverters for the remaining phase:
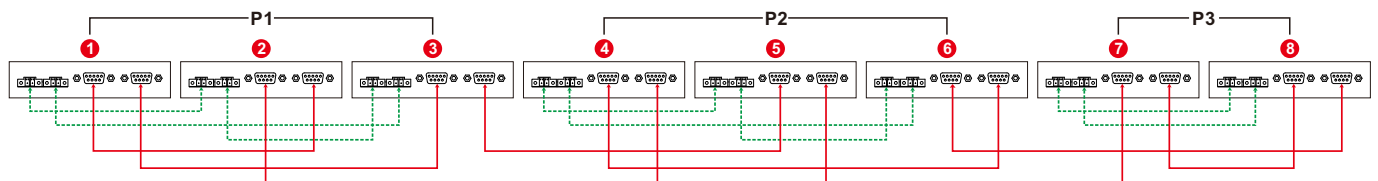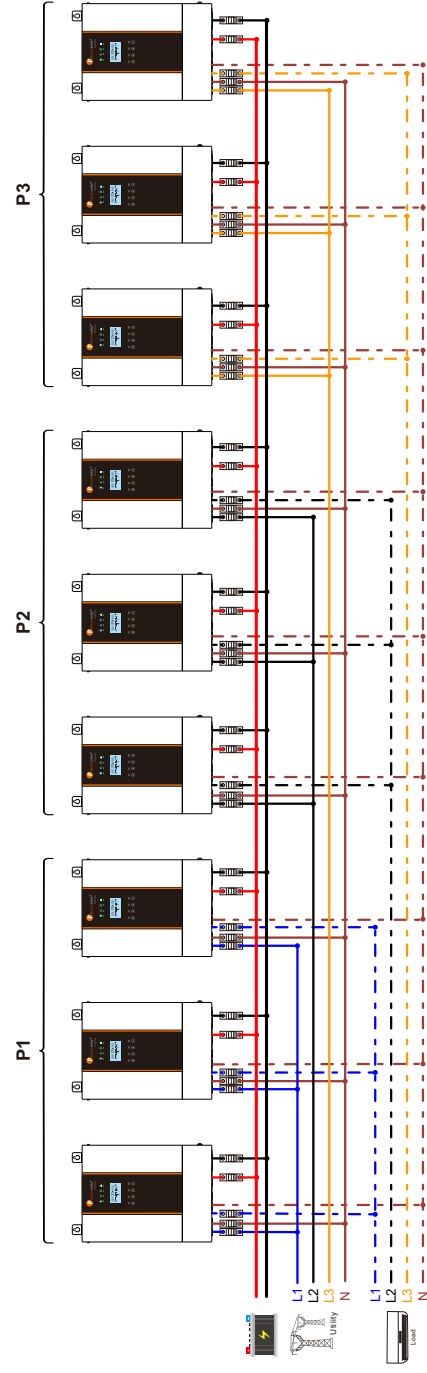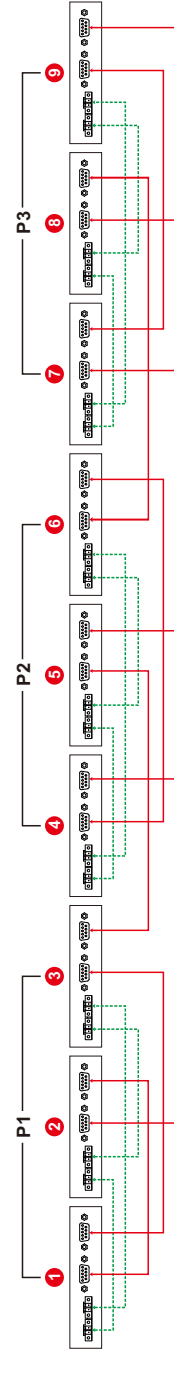
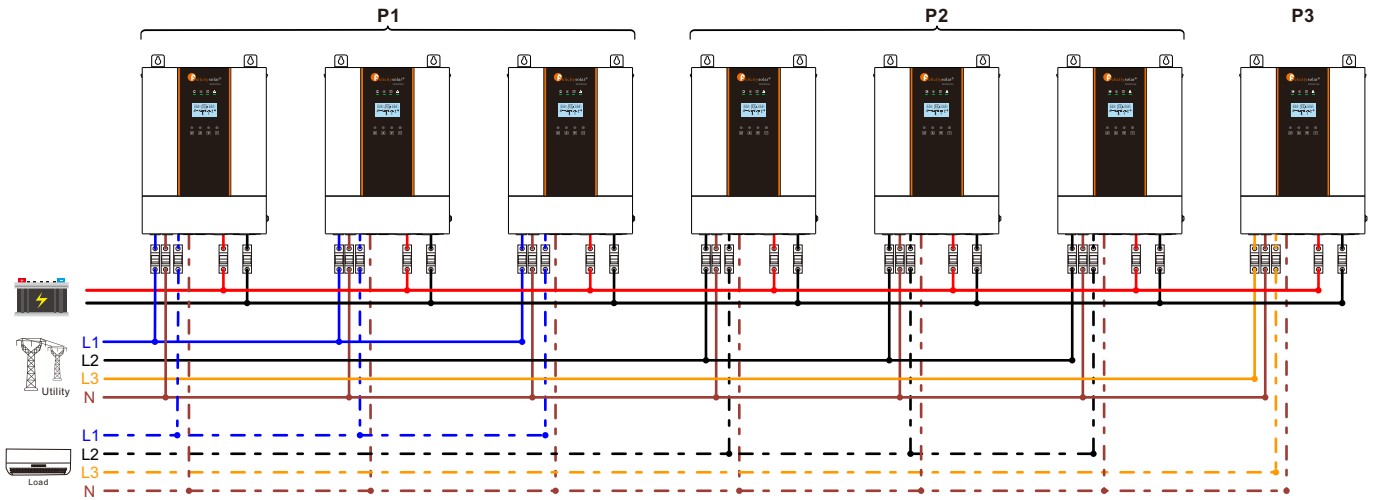**Power Connection**

Communication Connection

WARNING:
1. Before starting up inverters, please connect all N wires of AC output together.
2. Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters.
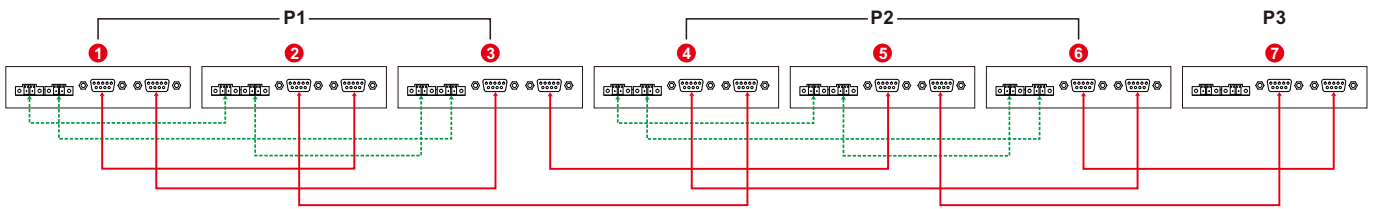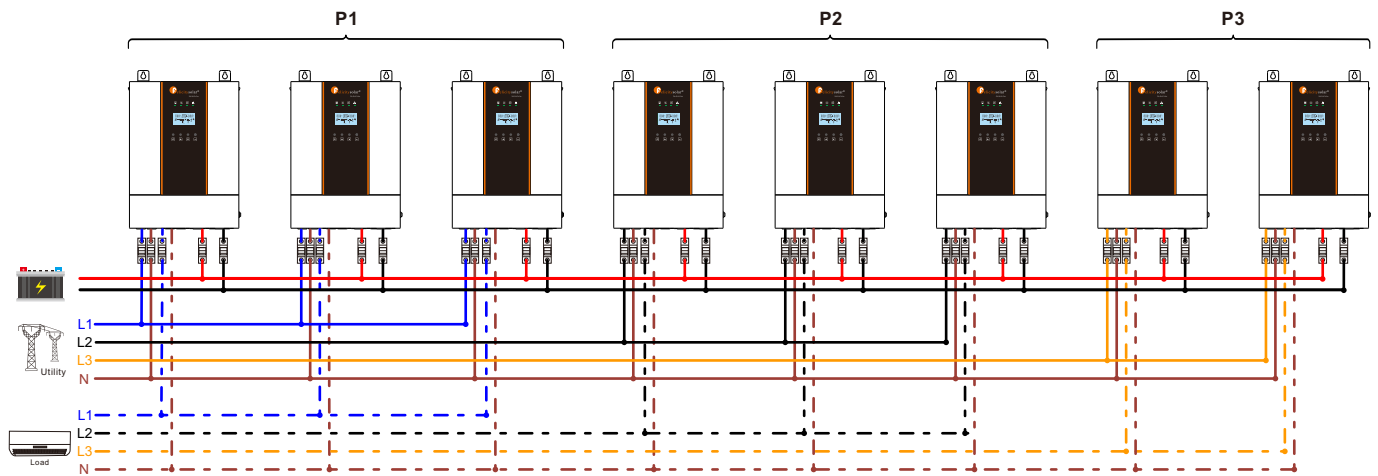
Four inverters in one phase, three inverters in second phase and one inverter for the third phase:

Power Connection

L1
L2
L3
N
L1
L2
L3
N
Utility
Load

Communication Connection

P3 ⑧
P2 ⑥
⑦
⑤
④
P1 ③
②
①

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Three inverters in each phase:

Power Connection

L1
L2
L3
N
L1
L2
L3
N
Utility
Load

Communication Connection

P3 ⑨
⑧
⑦
P2 ⑥
⑤
④
P1 ③
②
①

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Four inverters in two phases and only one inverter for the remaining phase:

Power Connection

Communication Connection

Four inverters in one phase and three inverters for the other two phases:

Power Connection

Communication Connection

Five inverters in one phase, three inverters in second phase and two inverters for the third phase:

Power Connection

P3

P2

P1

L1 L2 L3 N L1 L2 L3 N

Utility

Load

Communication Connection

P3

⑩

⑨

P2

⑧

⑦

⑥

⑤

P1

④

③

②

①

Four inverters in two phases and three inverters for the remaining phase:

Power Connection

P3

P2

P1

L1 L2 L3 N L1 L2 L3 N

Utility

Load

Communication Connection

P3

⑪

⑩

⑨

P2

⑧

⑦

⑥

⑤

P1

④

③

②

①

Five inverters in one phase, four inverters in second phase and two inverters for the third phase:

Power Connection

P3

P2

P1

L1
L2
L3
N
Utility

L1
L2
L3
N
Load

Communication Connection

P3
⑪
⑩

P2
⑨
⑧
⑦
⑥

P1
⑤
④
③
②
①

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Four inverters in each phase:

Power Connection

P3

P2

P1

L1
L2
L3
N
Utility

L1
L2
L3
N
Load

Communication Connection

P3
⑫
⑪
⑩
⑨

P2
⑧
⑦
⑥
⑤

P1
④
③
②
①

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Power Connection

Five inverters in one phase, four inverters in second phase and three inverters for the third phase:
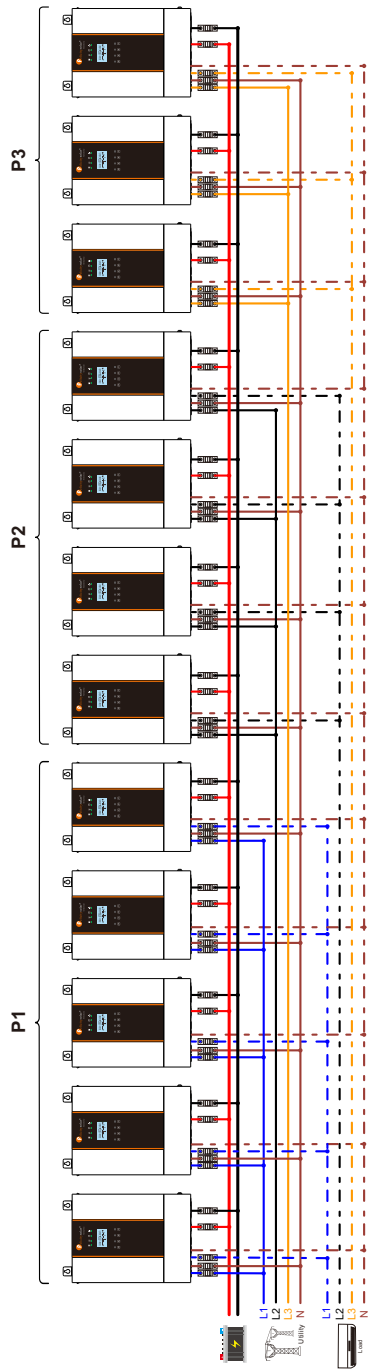
P3

P2

P1

L1 L2 L3 N
L1 L2 L3 N
Utility
Load

Communication Connection

P3

⑫
⑪
⑩

P2

⑨
⑧
⑦
⑥

P1

⑤
④
③
②
①
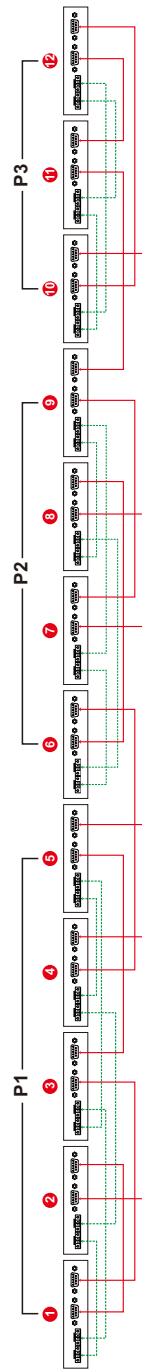
5. PV CONNECTION

Please refer to user manual of single unit for PV Connection.
CAUTION: Each inverter should connect to PV modules separately

6. LCD SETTING AND DISPLAY

Setting Program:

Program	Description	Selectable option	
28	AC output mode	**Single** 28 SIG **Parallel** 28 PAL **L1 Phase** 28 3P1 **L2 Phase** 28 3P2 **L3 Phase** 28 3P3	When the units are used in parallel with single phase, please select "PAL" in program 28. It is required to have at least 3 inverters or maximum twelve inverters to support three-phase equipment. It's required to have at least one inverter in each phase or it's up to ten inverters in one phase. Please select "3P1" in program 28 for the inverters connected to L1 phase, "3P2" in program 28 for the inverters connected to L2 phase and "3P3" in program 28 for the inverters connected to L3 phase. **Do NOT** connect share current cable between units on different phases.

7. COMMISSIONING

Parallel in single phase

Step 1: Check the following requirements before commissioning:
● Correct wire connection.
● Ensure all breakers in Line wires of load side are open and each Neutral wires of each unit are connected together.
Step 2: Turn on each unit and set "PAL" in LCD setting program 28 of each unit. And then shut down all units.
NOTE: To be safe, it's better to turn off switch when setting LCD program.
Step 3: Turn on each unit. If all inverters are configured correctly, one unit will show "HS" in LCD display, and others are "SL". Otherwise, please double check the procedure of Step1 and Step 2.
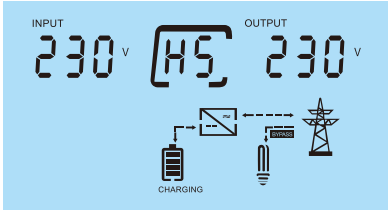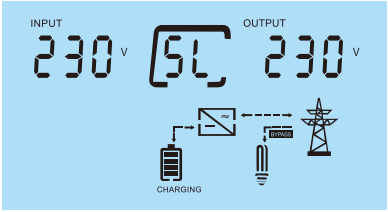
LCD display in Master unit	LCD display in Slave unit
INPUT OUTPUT 0 V HS 230 V	INPUT OUTPUT 0 V SL 230 V

NOTE: Master and slave units are randomly defined.

Step 4: Switch on all AC breakers of Line wires in AC input. It's better to have all inverters connect to utility at the same time. However, these inverters will automatically restart. If detecting AC connection, they will work normally.

LCD display in Master unit	LCD display in Slave unit

Step 5: If there is no more fault alarm, the parallel system is completely installed.

Step 6: Please switch on all breakers of Line wires in load side. This system will start to provide power to the load.

Support three-phase equipment

Step 1: Check the following requirements before commissioning:
- Correct wire connection
- Ensure all breakers in Line wires of load side are open and each Neutral wires of each unit are connected together.

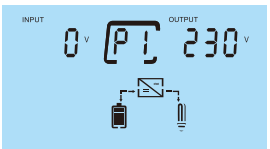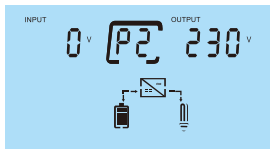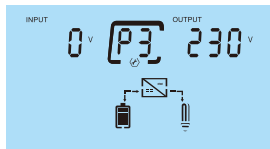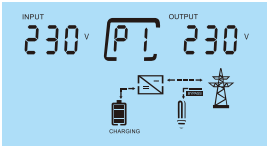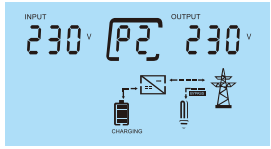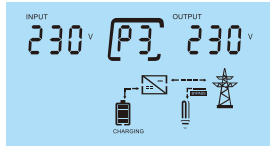Step 2: Turn on all units and configure LCD program 28 as P1, P2 and P3 sequentially. And then shut down all units.

NOTE: To be safe, it's better to turn off switch when setting LCD program.

Step 3: Turn on all units sequentially.

LCD display in L1-phase unit	LCD display in L2-phase unit	LCD display in L3-phase unit

Step 4: Switch on all AC breakers of Line wires in AC input. If AC connection is detected and three phases are matched with unit setting, they will work normally. Otherwise, the AC icon ⚡ will flash and they will not work in line mode.

LCD display in L1-phase unit	LCD display in L2-phase unit	LCD display in L3-phase unit

Step 5: If there is no more fault alarm, the system to support 3-phase equipment is completely installed.

Step 6: Please switch on all breakers of Line wires in load side. This system will start to provide power to the load.

Note 1: To avoid overload occurring, before turning on breakers in load side, it's better to have whole system in operation first.

Note 2: Transfer time for this operation exists. Power interruption may happen to critical devices, which cannot bear transfer time.

8. FAULT CODE TABLE

When fault event happens, inverter will cut off output, and the fault LED is solid on. At the same time, fault code, icon ⚠ and ERROR are shown on the LCD screen.

Fault Code	Fault information	Trouble Shooting
40	CAN data loss	1. Check if communication cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
41	Host data loss	
42	Synchronization data loss	
43	Current feedback into the inverter is detected.	1. Restart the inverter. 2. Check if L/N cables are not connected reversely in all inverters. 3. For parallel system in single phase, make sure the sharing cables are connected in all inverters. For supporting three-phase system, make sure the sharing cables are connected in the inverters in the same phase, and disconnected in the inverters in different phases. 4. If the problem remains, please contact your installer.
44	The firmware version of each inverter is not the same.	1. Update all inverter firmware to the same version. 2. Check the version of each inverter via LCD setting and make sure the CPU versions are same. If not, please contact your installer to provide the firmware to update. 3. After updating, if the problem still remains, please contact your installer.
45	The output current of each inverter is different.	1. Check if sharing cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
46	AC output mode setting is different.	1. Switch off the inverter and check LCD setting program 28. 2. For parallel system in single phase, make sure no 3P1, 3P2 or 3P3 is set on program 28. For supporting three-phase system, make sure no "PAL" is set on program 28. 3. If the problem remains, please contact your installer.