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Fault 514: communication error between the meter and the SH5K+

Fault 514 indicates that there is a communication error between the meter and the inverter.

1 Summary

It is best to call us as soon as possible when any fault is identified. Please check as follows:

1. Is there another inverter on the same phase as the SH5K? If so, go to section 2 (click the number). If the other inverter is the SH5K+, then check the wiring diagram in section 7 (again, click the number—all section numbers in this document are links).
2. Check section 3 to check the communication cable wiring.
3. Is it a single-phase or three-phase property? Check the appropriate wiring diagrams in sections 4 and 5, respectively.
4. Is there a long meter communication cable run, i.e. is the inverter far from the main switchboard and the meter? Put the 120 Ohm resistor switch 2 on as per section 6.
5. Restart after correcting the wiring as per section 8.
6. To check the installation and wiring is correct, check the power flows on the LCD.
7. Replace the communication cable as discussed in section 11.
8. Refer to section 11 for examples of how not to install the meter.

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2 Existing System Wiring and Settings

If there is another PV inverter installed in the system, make sure the PV inverter is installed at the joint of the solar supply main switch, the load and the Sungrow meter, see Figure 1.

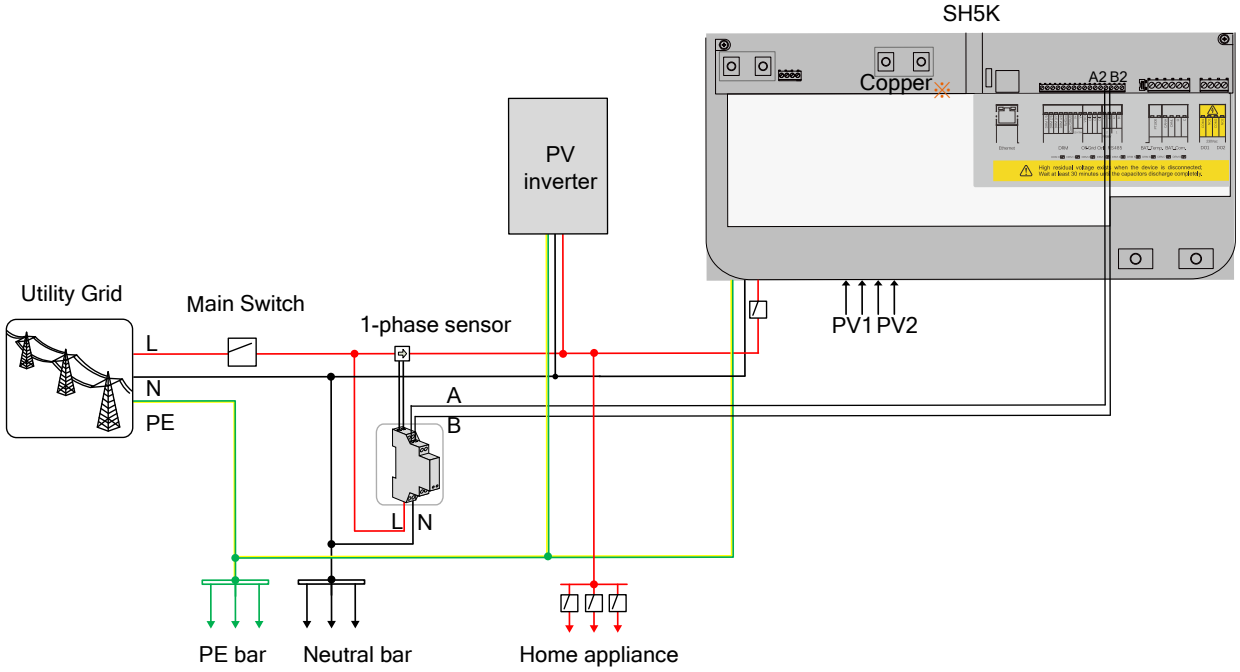

Figure 1: Wiring of the System with another PV inverter

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Go to the LCD and enable the Existing System function following the steps shown in Figure 2 Settings of the Existing System.

Main Screen (Press ENT)→Menu (Press ▼×2)→Settings (Press ENT)→Input password 111 (Press ENT)→Settings (Press ▼×10)→Existing Sys (Press ENT)

Existing Sys Rated-P:

the rated power of the existing system (ESRP).

Total Export Limit:

export power upper limit of the property. This will automatically change to 5000 + ESRP.

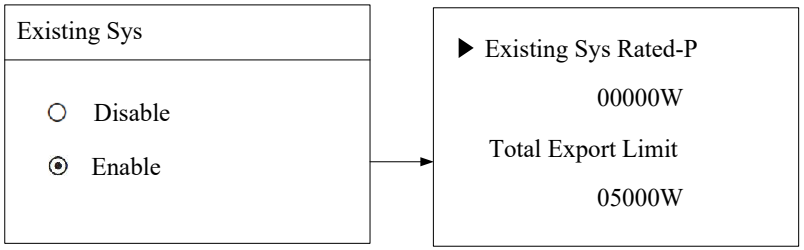

Figure 2: Settings of the Existing System

3 Communication Cable Wiring

Check that the connections are correct as detailed in the meter connection section of the SH5K+ user manual. Check Figure 3. The standard RS485 or data cable (supplied with the meter) needs to be connected between the inverter and the meter.

1. Connect the A & B terminals in the meter (terminals 2 and 5 on the middle top tier) to the A2 & B2 terminals in the inverter (A to A2, B to B2).
2. Make sure that all of the screw terminals are screwed in well, with the wiring well connected on A2 & B2.

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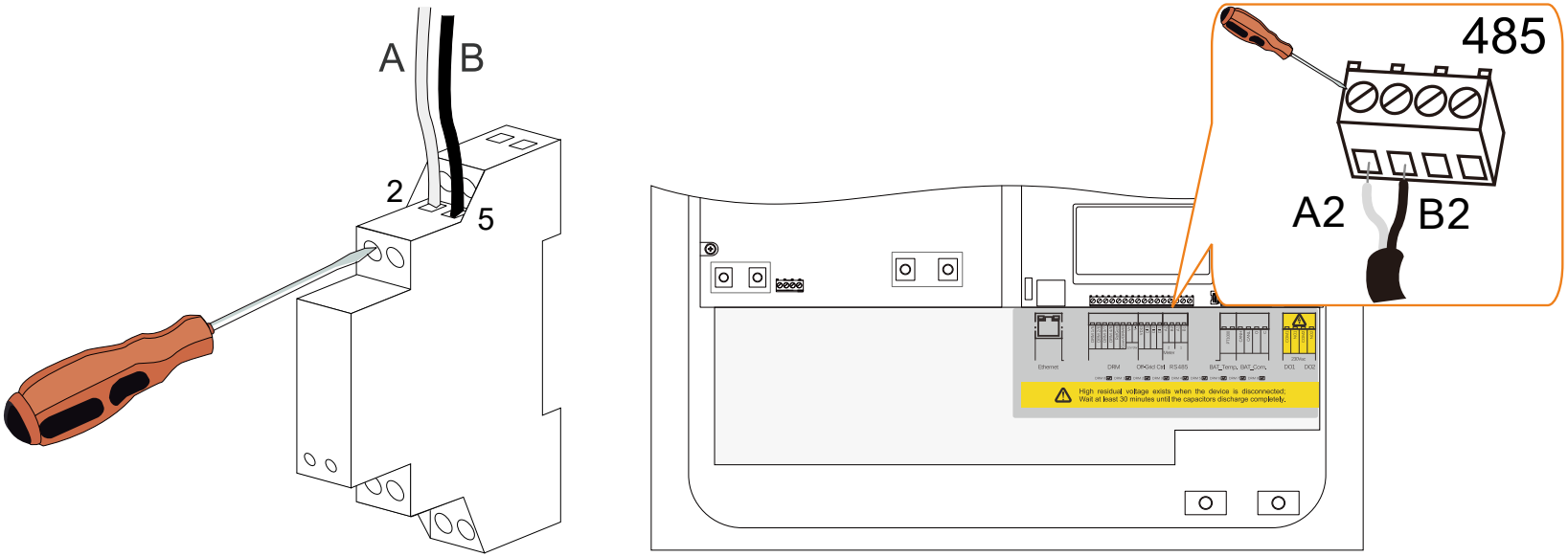

Figure 3: Wiring for the communication cables

4 Single-phase Property Wiring

Place the CT clamp after the main switch, or between the utility meter and the main switch. For a gross meter, the CT clamp needs to go over both wires connected to the gross meter for the net of load consumption and solar production, with the arrow of the CT clamp pointing in the direction of current flow.

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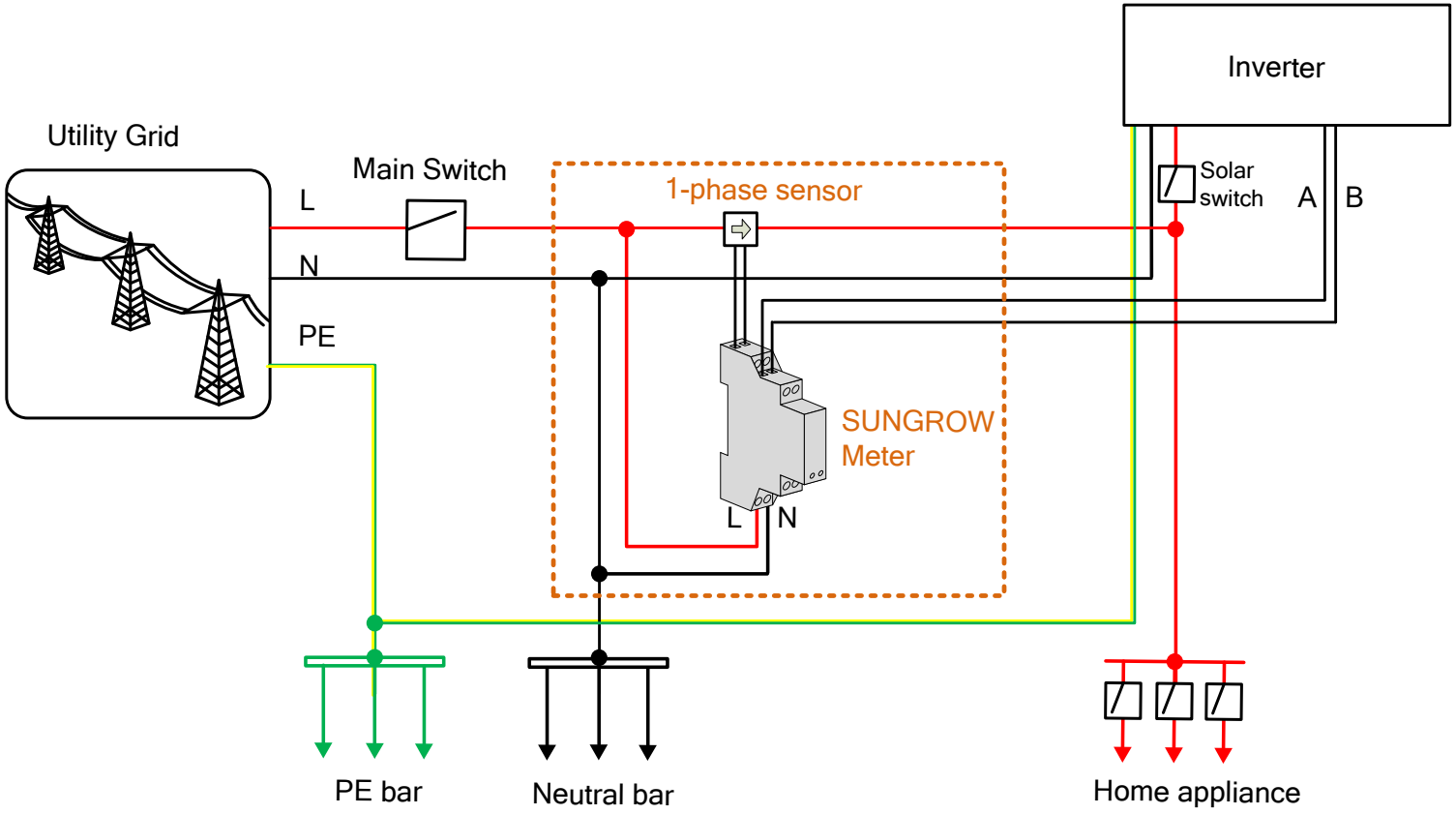

Figure 4: Single-phase Property Wiring

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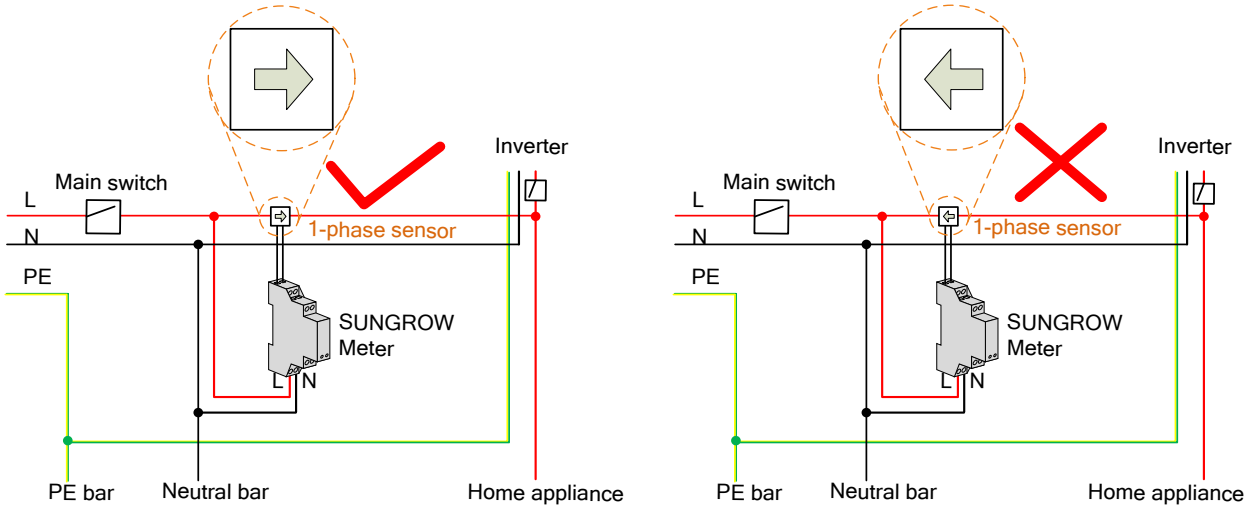

Figure 5: CT clamp (single-phase sensor) and line and neutral connections

5 Three-phase Property Wiring

Please check the wiring diagram for a three-phase system in Figure 6 Wiring Diagram for a Three-phase Property (with an SH5K+, STB5K and a grid-connected inverter). The CT sensor is a single-phase sensor, so should only measure the power on a single-phase circuit. Regarding the location of the CT clamp and wiring, treat the sub-main switch for the single-phase of the inverter as if it is the main switch for a single-phase system in the above instructions. Locate the inverter and CT clamp on the phase that draws the most power, or move loads to that phase. Put the CT clamp between the phase main switch and the solar supply main switch, or immediately before the phase main switch (with nothing else in between other than the wire).

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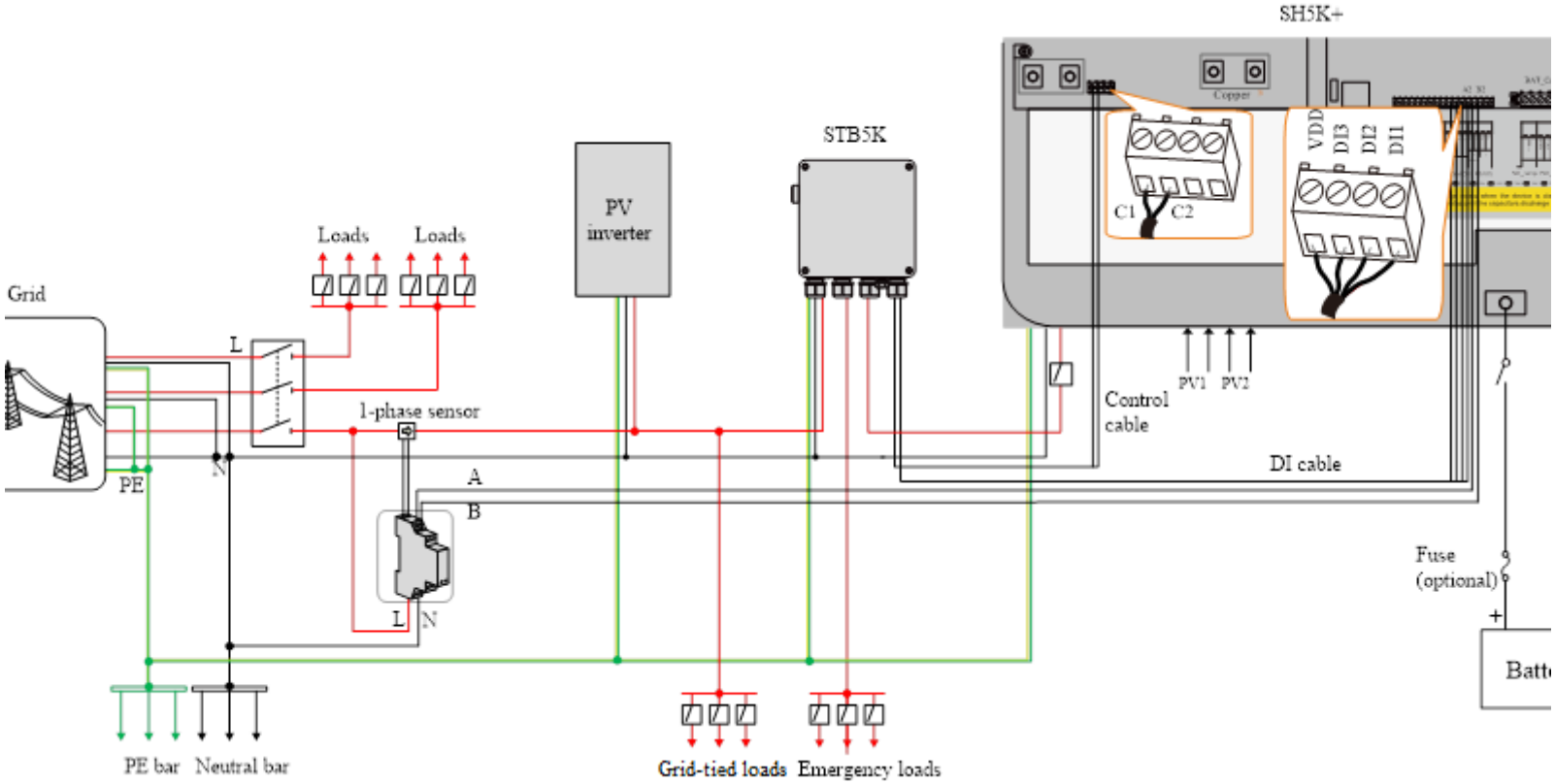

Figure 6: Wiring Diagram for a Three-phase Property (with an SH5K+, STB5K and a grid-connected inverter)

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6 Extended Communication Cables

When the length of RS485 cable is longer than 100 m, push the 120 Ohm (2) switch to “ON” to ensure stable communication, as shown in the figure. Fault 514 may still occur with an extended cable of less than 100 m.

If the communication cables are extended, but the meter does not work in the main switchboard or sub-board far from the inverter (thus requiring an extension of the cables), put the 120 Ohm resistor switch 2 to on.

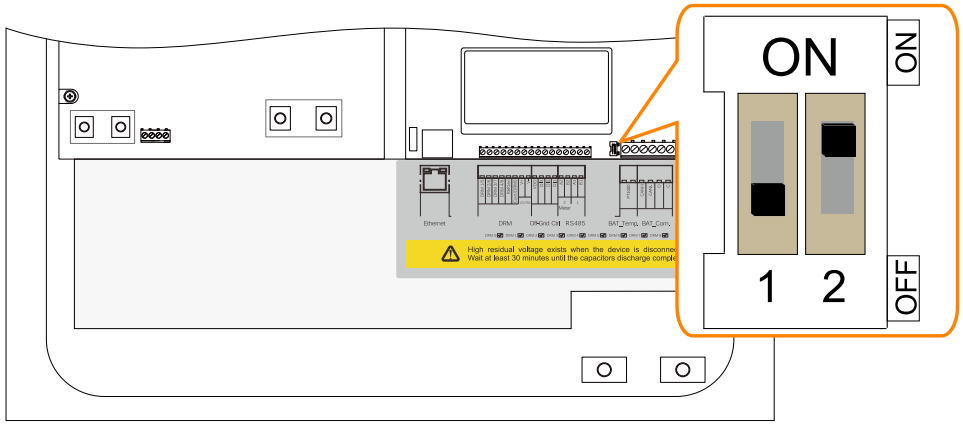

Figure 7: 120 Ohm Resistor Setting

Fault 514 may still occur with an extended cable of less than 100 m.

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If the meter works with the short supplied communications cables, and the meter does not work with the extended communications cables no matter where the CT clamp is placed, then the extended cables should be the cause of the fault. Check the connection of the cables. Try replacing the cables.

7 Two SH5K+s on the Same Phase

Please see Figure 8. The diagram does not show the connection of the STB5K or another inverter, for that please refer to Figure 4 Wiring Diagram for a Three-phase Property (with an SH5K+, STB5K and a grid-connected inverter).

As a last resort, with two SH5K+s you can swap the meters and CT clamps.

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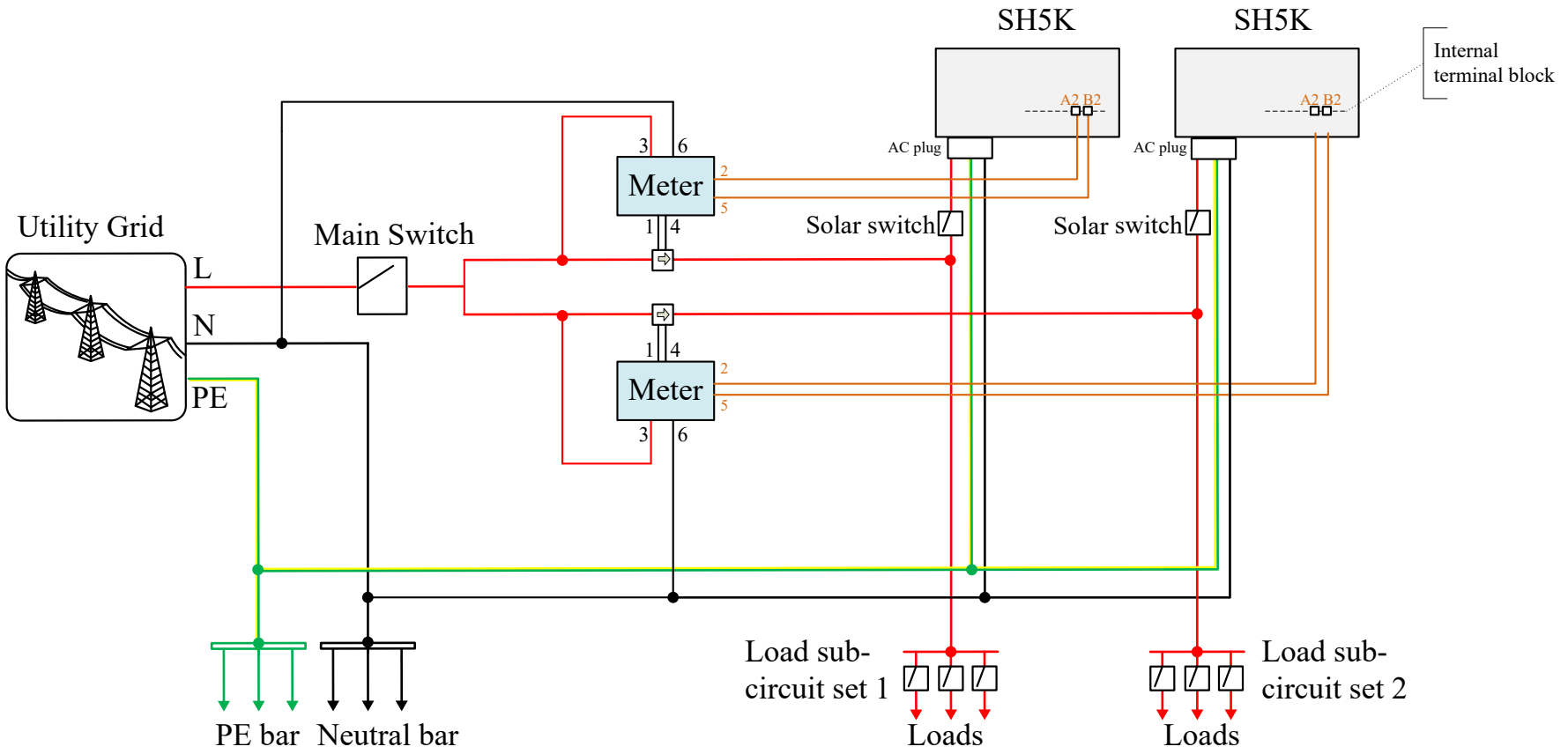

Figure 8: Wiring Diagram for two SH5K+s with a Single-phase Property

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8 Restart

If the fault persists, restart the inverter. The fault will not clear without restarting the inverter after the meter is correctly installed.

The restart procedure is as follows for the SH5K+:

1. Program off the inverter. Press ENT on the main screen, tap down to go to on/off and change to off.
2. Turn off the DC PV array isolator (which is located next to the inverter) and turn off the battery circuit breaker and battery.
3. Turn off the solar supply main switch or the AC isolator.
4. Wait until the inverter shuts down completely (there will be no LEDs lit up and no display). Once the LED and LCD turn off, wait for a further 30 s to allow the energy in the inverter's capacitors to dissipate.
5. Turn on the solar supply main switch or the AC isolator (whichever was turned off in step 1).
6. Turn on the DC PV array isolator and turn on the battery circuit breaker and battery.
7. Wait a few minutes for inverter recovery.

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9 Troubleshooting

9.1 Check whether the meter works

Check the PWR/COM LED on the meter (Figure 9). If the LED is yellow and flashing,it indicates that the meter is communicating with the inverter. If it is off or on, there's issue with the meter or communication cable wiring.

Figure 9: PWR/COM light on the S100 Sungrow meter

Test to see if the meter works. Program off the inverter. Press **ENT** on the main screen, tap down to go to on/off and change to off. The status on the main screen should change to key-stop. Put the CT clamp over one household load (it is better for a circuit with loads that are drawing power. Look at the Grid power flow on the main screen. If the power flow is not a dash, the meter should work correctly, and fault 514 should occur because of some issue other than the meter not working.

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9.2 Check Meter Installation

Test the meter in key-stop mode (with the inverter off and with the loads on), with the inverter on but with the loads off. Check the readings on the LCD to make sure that they make sense (e.g. inverter off, power goes in from the grid and the same amount goes to the house; inverter on, loads off, PV power goes to the grid [it will be low or zero with zero export]).

9.2.1 For Incorrect Installation Position

Make sure that the 1-phase sensor of the SUNGROW meter should be placed to the phase line (L) from the main switch. If otherwise, the energy flow indicated on the LCD will be wrong.

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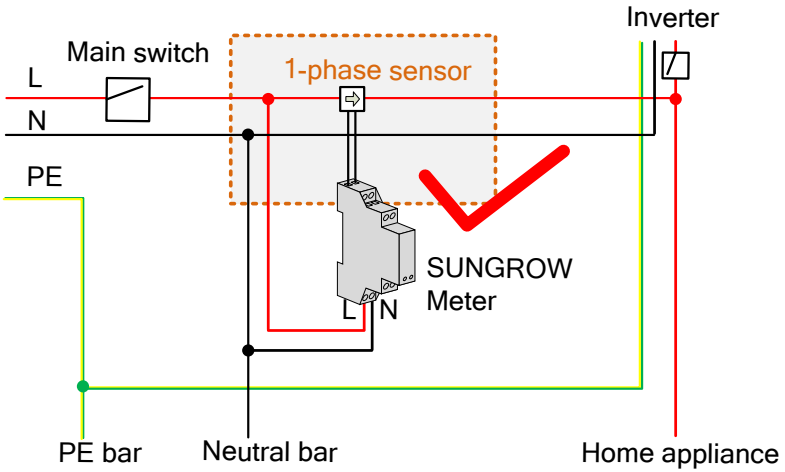
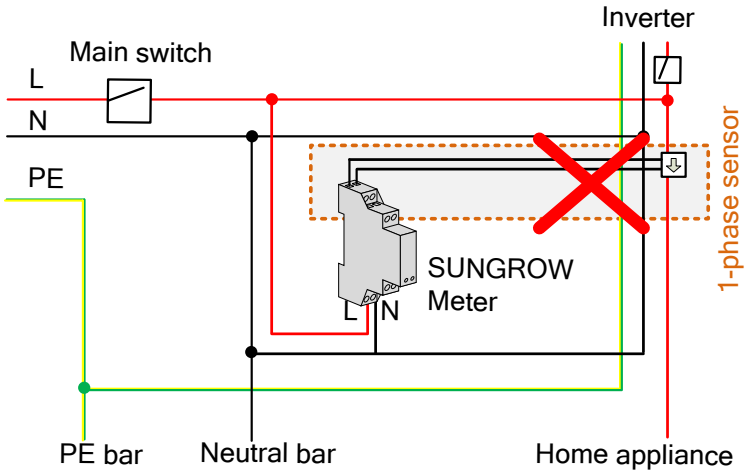
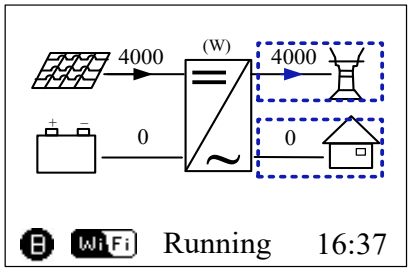
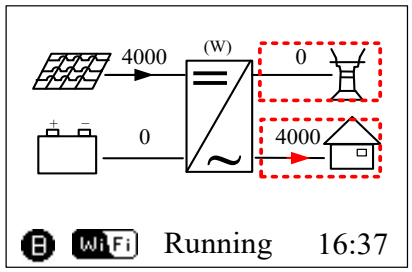




Action	LCD Display Explanation
Turn off all the household loads. All the PV power generation should be exported to the grid, as shown in the "Correct" figure.	Correct  Wrong 

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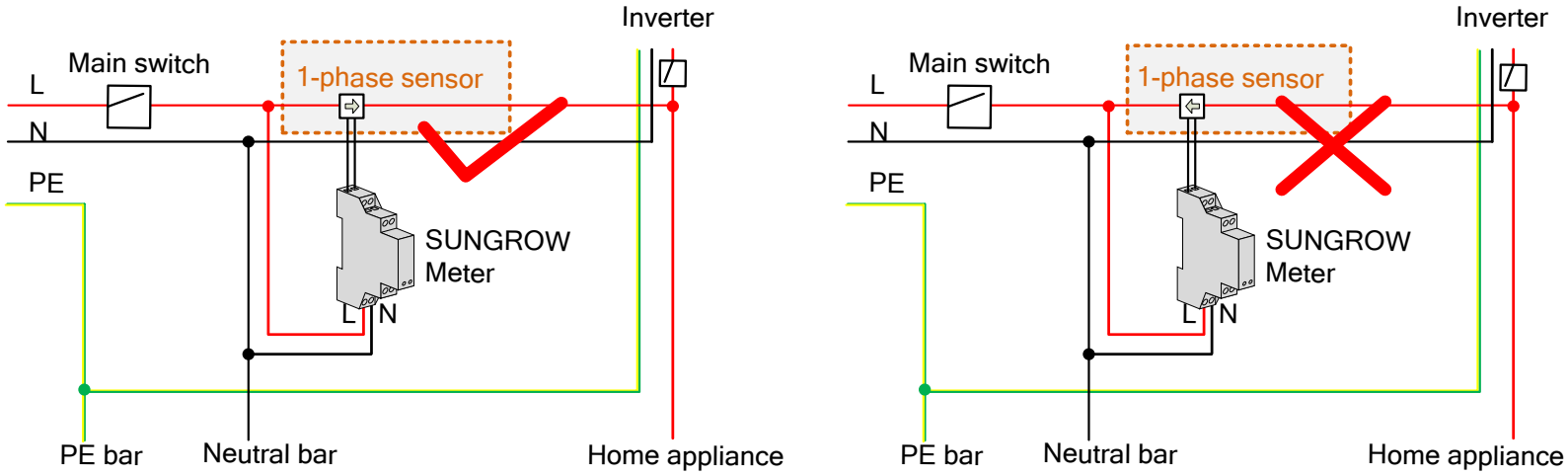
9.2.2 For Reverse Sensor Connection

Make sure that the arrow on the 1-phase sensor must point away from the grid towards the load. If otherwise, the energy flow indicated on the LCD will be wrong.



NOTICE

The reverse sensor connection will cause the communication fault 514.

To clear the fault 514, please turn off the DC sources and then restart the system after reconnecting the sensor in correct direction.

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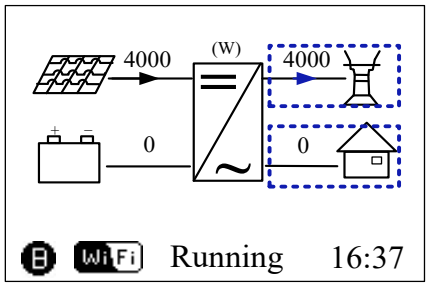
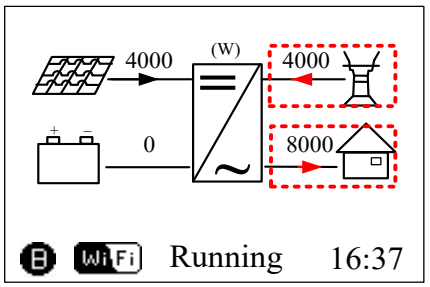
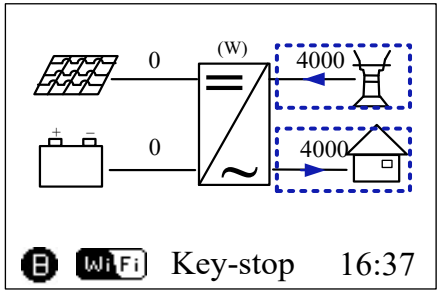
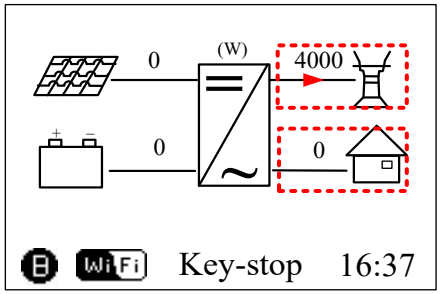
Action	LCD Display Explanation
Method 1: Turn off all the household loads. All the PV power generation should be exported to the grid, as shown in the "Correct" figure.	Correct  Reverse 
Method 2: Stop the inverter via the LCD menu. Turn on the household loads. All the load power consumption should be imported from the grid, as shown in the "Correct" figure.	Correct  Reverse 

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10 Replace the communication cables

In only a couple of cases we have handled, replacing the communications cables fixed the issues after checking everything else, even when there was continuity with the original cables. This may be because the cores may have burnt in the original cables, or the resistance increased, with current still flowing but not the full amount.

11 Appendix: How Not to Install the Meter

It is best not to deviate the wiring from the wiring diagrams we provide. However, if considering a different wiring setup from the wiring diagrams we provide, it is best to check with us first. From the t-joint that connects the inverter and solar supply main switch in one direction, loads in another direction, and the meter and grid in the third direction, do not have another wire going from this joint which bypasses the meter and connects to another joint anywhere on the grid side of the meter. This will cause the loads to read incorrectly.

Figure 10 shows an example of a system that was wired incorrectly, with the offending wire drawn as a dashed line.

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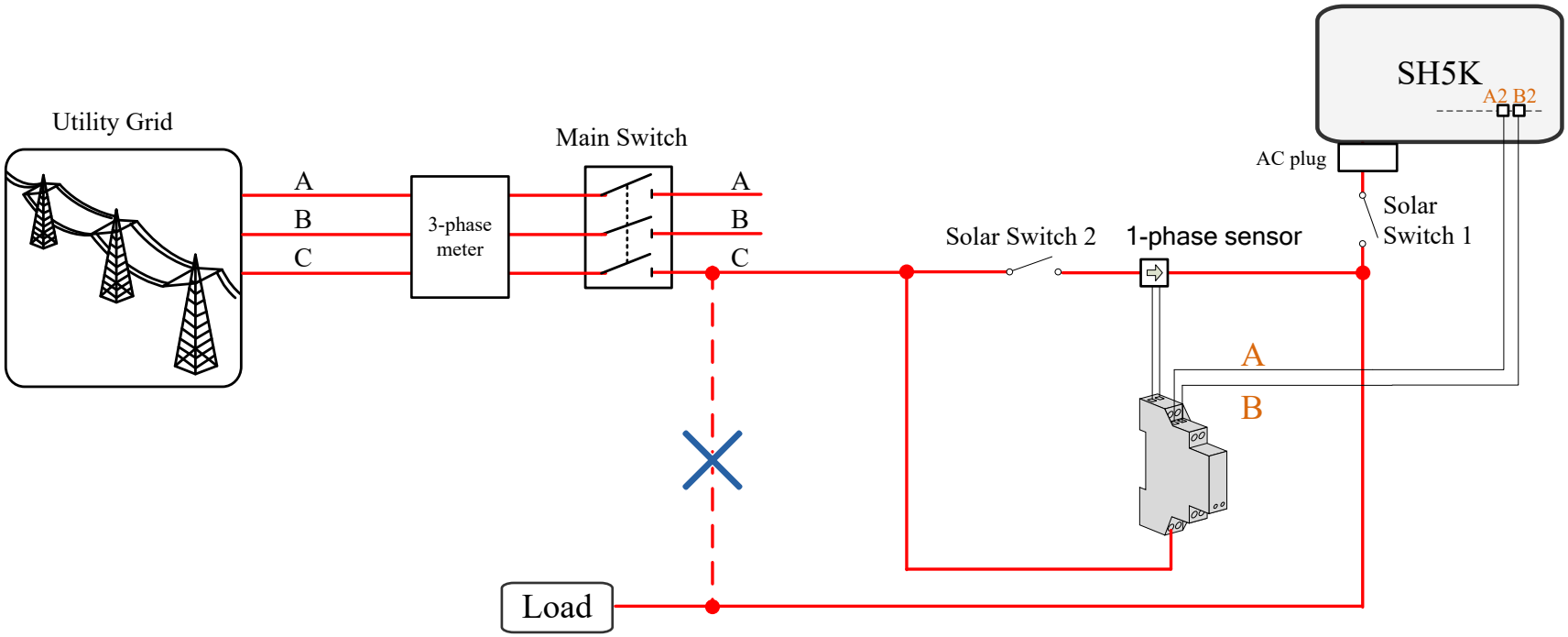

Figure 10: Do not bypass the meter when wiring the loads and SH5K+